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Second Language Vocabulary Acquisition and Internalization

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1. Introduction

1.1 Background

The acquisition of first language (hereinafter L1) has been studied extensively and has made tremendous advancement over the past few decades. By virtue of the rigorous research conducted in diverse multidisciplinary areas including cognitive linguistics, neuroscience, artificial intelligence (computational simulation), etc., much of the large picture of the underpinnings of language (L1) acquisition has been uncovered. In sharp contrast to that, little is known about the cognitive mechanisms that underlie the acquisition of second language (hereinafter L2), especially that of vocabulary (Second Language Vocabulary Acquisition, or SLVA). The spurious yet dominant assumption is that L2 acquisition involves primarily the association of a new word form with an old concept. In other words, most scholars take it for granted that L2 does not need to be acquired from scratch and thus not much cognitive processing is required; rather, memory retention constitutes the key of success, according to such view. This is evident in the fact that instead of going into exploring the cognitive and psycholinguistic realities of L2 acquisition (used interchangeably with the abbreviation SLA), applied linguists have largely confined their foci of interest to the behavioral aspects of L2 learners, in particular learning strategies, learner motivation, noticing, guessing from contexts, and the like. What is more, test methods adopted in most of these studies seem to be equating the retention of an L1 equivalent or dictionary meaning with success in vocabulary acquisition. The emphasis on form-meaning retention can be interpreted as arising from the overriding priority given to communicative ability—it is possible for an L2 learner to communicate to some extent simply by memorizing the L2 lexical items as approximate equivalent of the L1 counterparts, as long as the new L2 forms are acquired.

What these studies fail to resolve is, however, the crucial and fundamental issue as to how learners gradually develop target-like competence (i.e. accuracy). A number of scholars do acknowledge that "simple transfer of an L1 structure to L2 is not sufficient to guarantee correct usage" (MacWhinney, 2001, p. 84) and that most L2 words do not overlap perfectly with their L1 equivalents. Nevertheless, they seem to be complacent with the simplistic idea that L2 learners generally rely on L1

concepts to bootstrap the initial phrases of learning and somehow, miraculously, manage to build up target-like L2 representations over time (see, e.g., Pavlenko, 2009). There is no attempt to explain how this comes about. Without a process explanation, the legitimacy of these claims remains in doubt as they are more speculative rather than being psycholinguistically sound. One may reasonably argue that such acquisition views have overestimated the dependence on L1 in the early stages (there is no reason as to why acquisition must invariably start off from L1 concepts), at the same time underestimating the usefulness of L1 in the construction of L2 representations. There is a robust literature that examines the role of L1 in SLA, however, mostly from the perspective of contrastive linguistics which focuses on the classification of error (L1 transfer being one of the causes). To date, the literature has yet to establish a comprehensive cognitive account of SLA within which the roles of L1 can be systematically defined.

Likewise, with regard to the well-documented failure of L2 learners to achieve full mastery (i.e. *fossilization*), the literature remains to adhere to the descriptive approach by merely suggesting possible causes of the phenomenon in an arbitrary and haphazard fashion. These paradigms appear to have overstressed the façade of learner variability observed on the superficial level and as a result, overlooked the importance to establish a systematic and coherent way to account for both success and failure of acquisition. The fatal flaw of these informal models is that they fail to provide an exhaustive framework that elaborates the "necessary and sufficient conditions" that are essential for full mastery. In other words, what is apparently lacking in such descriptive researches is the ability to make predictions, and thus what they claim to be the causes of incomplete acquisition are not always true on the reverse side. A good model should be able to derive reliable predictions about learning outcome when given a particular input and input processing. Besides, it should also possess the capacity to provide explanation for diverse SLA related phenomena, including any possible individual difference that may arise along the course of acquisition.

On the other hand, the fruitful researches produced in the domain of L1 acquisition, despite having significant influence on the studies of SLA, cannot be applied directly considering the different resources and processing ability possessed

by L2 learners especially adults. L2 learners are armed with a rich repertoire of L2 concepts, but generally suffer from a dearth of input; adult L2 learners are in the formal operational stage of Piagetian development, implying cognitive maturity including deductive reasoning (Piaget & Inhelder, 1969) and selective attention (Miller, 1985) which can be a double-edged sword for language acquisition (Tremaine, 1975). These differences, at the same time, underscore a crucial factor that characterizes language acquisition of adults: economy of time and effort. Adult L2 learners are, in many instances, given only very limited time to acquire an L2 to a level that enables them to function adequately in highly complex communicative activities. For instance, foreign students who study in Japan are usually given a duration as short as a year or two at most to acquire the Japanese language prior to engaging in various linguistically demanding academic activities such as attending lectures, writing technical reports, making presentations, etc. The only plausible way to explain how learners cope with such stringent time constraint compounded by the poverty of input would be the full utilization of their cognitive ability and L1 resources. In fact, a number of researches have demonstrated that older learners outperform younger ones given limited input (e.g. taught as a subject in school settings), providing evidence for the well-developed cognitive capacity of these older learners. Considering the centrality of efficiency in the acquisition of L2, it is vital that the issue of how adult learners acquire a considerable range of use with the least effort (or amount of input) be addressed—in addition to the issue of accuracy—within the model.

A third and indispensable dimension in illustrating the full picture of L2 acquisition is none other than fluency, or automatization of knowledge. As DeKeyser (2001, p. 126) puts it, "without automatization no amount of knowledge will ever translate into the level of skill required for real life use". However important automatization may be for the adequate performance of L2, it has not received much attention in the field of applied linguistics (DeKeyser, 2001; Schmidt, 1992). The negligence of automaticity is believed to stem, at least partially, from the conventional view (Chomsky, 1965; Ellis, 1994) that draws a sharp distinction between "competence" and "performance". As Crookes (1991) pointed out, the study of L2 competence has remained as the mainstream, and among works that

investigate L2 performance, studies of L2 comprehension greatly outnumber studies of production. The lack of both empirical and theoretical studies on L2 automaticity leaves many issues unresolved, particularly concerning how automaticity develops.

Given the scarcity of research, the study of automaticity of L2 production skills relies heavily on extrapolation from established theories in the field of skill acquisition, such as ACT* Theory[1] (Anderson, 1982, 1983), model of restructuring (McLaughlin, 1990), instance theory (Logan, 1988a, 1988b), and chunking theories (Newell, 1990; Servan-Schreiber & Anderson, 1990). These studies derive evidence primarily from experiments involving skills such as typing, digital logic gates, alphabet arithmetic, and programming, tasks of which learning mechanisms may differ from that required for the automatized use of second language (Schmidt, 1992).

The present study is motivated by the fact that both automaticity and accuracy are equally important factors that underlie acquisition. Automaticity, according to Johnson (1996, p. 137), is defined as "the ability to get things right when no attention is available for getting them right". Processing capacity and attention are the two most important properties of automaticity (Schneider, Dumas, & Shiffrin, 1984). Thus, the lack of automaticity may potentially lead to the impairment of fluency (if the learner chooses to pause to think for the correct word) or accuracy (if the learner decides to keep the fluency of speech even at the expense of accuracy) during real-time production. Scholars in applied linguistics typically make a distinction between "error" caused by inadequate knowledge (i.e. competence), and "mistake" attributed to processing problems (see, e.g., Ellis, 1994, p. 58). Mistakes, or more commonly known as slips of the tongue, have conventionally been studied particularly in the research of L1 acquisition as a source for examining the retrieval process during speech production (see, e.g., Fromkin, 1980; Poulisse, 1999), but much less as a subject for the investigation of acquisition or knowledge structure. This is mainly due to the incidental nature of these performance mistakes in contrast

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[1] ACT* (pronounced as "act-star") is the abbreviation for Adaptive Control of Thought* and was expanded from the ACT theory. It was later further extended into the ACT-R ("R" for "Rational") model of human cognition by John R. Anderson.

to errors that are believed to reflect the system of learners' interlanguage (Ellis, 1994). However, in the case of L2 acquisition, mistakes may persist in the performance of learners at a relatively stable frequency and observable tendency, particularly among those who share the same L1 and similar language learning background. They might "know" the exact expression for a situation, yet experience difficulty in producing the correct word during spontaneous production due to the lack of automaticity.

There are reports showing that even advanced learners do not necessarily achieve full mastery in terms of automaticity of lexical, syntactic, and phonological encoding (de Bot, 1992; Rehbein, 1987; Sajavaara, 1987). Therefore, automaticity of L2 skills deserves a more systematic account and should not be taken for granted that "practice makes perfect". Moreover, a comprehensive understanding of the mechanisms underlying automaticity is crucial in knowing the kind and amount of practice needed to foster fluency in an efficient manner.

The present thesis thus argues that there is a need to establish a cognitive model that accounts for the development of the three goals: accuracy, efficiency, and automaticity. Although applied linguists generally see a dichotomy between competence (development of accuracy) and performance (development of automaticity), accuracy and automaticity may indeed progress alongside one another, as suggested by the learning curves reported in DeKeyser (1997). The notion is also consistent with Skehan's (1998) review, in which he emphasizes that the three goals of fluency, accuracy, and complexity (corresponds to the dimension of "scope of use" described above) are in a state of mutual tension. In certain cases, whether an inappropriate usage arises from the lack of knowledge (competence) or automaticity can be easily identified (e.g. via learner's self-report); in many others, however, the distinction is vague especially when an extended processing time is required for retrieval of the appropriate word. As Kemmer and Barlow (2000: xi) put it, "Performance errors, for example, are not viewed as due exclusively to 'processing factors', and thus are not treated as a completely separate phenomenon from other utterances not licensed by competence". In short, the two components most likely progress on the same continuum and thus it is unrealistic to discuss them on completely independent dimensions.

1.2 Objective

The present research aims to postulate the cognitive processes that underlie the acquisition of lexical knowledge. Among the different aspects of vocabulary, the study will focus on the acquisition of meaning, or more precisely, the formation of concept. As a working definition, concept is defined as "the mental representation associated with a word, which has the capacity to refer to a range of referents intended by the speaker". As a general orientation, I incline to the position of a usage-based paradigm which posits that concept arises out of language use. It is important to note that the present study does not distinguish concept from meaning or constraints on use (which may include connotations, register, frequency, etc.) as how Nation (2001) classifies the different aspects of word knowledge. Rather, all of these aspects are conceived as embodied in the conceptual representation. As Meara (2010) has pointed out, Nation's characterization is built on Richards's (1976) paper that outlines eight assumptions about what constitutes vocabulary knowledge. Richards's framework is a pedagogic framework rather than a psycholinguistic one, and thus is inappropriate to be treated as a comprehensive account of vocabulary knowledge (Meara, 2010). Also, from a usage-based viewpoint, properties such as connotation, frequency, etc. comprise part of the communicative intention of a speaker; which features are core (equivalent to what Nation views as concept) and which are peripheral is no more than a matter of degree, rather than being completely distinct entities.

The present research does not address the problem as to how phonological aspects and grammatical functions are acquired; however, the proposed model should be able to resolve these issues on extension of the present framework.

This study targets on adult learners who are exposed to the L2 only after puberty. The objective of the research is to propose a comprehensive framework that accounts for the following:

1. How do L2 learners develop lexical competence and fluency of access?

   The proposed model aims to illustrate the dynamics of the three dimensions: accuracy, automaticity, and scope of use (efficiency). It is hypothesized that the L2 conceptual structure formed is a product that reflects these three components. Acquisition, according to the view of this study, entails at least

comprehension, processing, organization, and retention. The terms acquisition and learning will be used interchangeably unless specifically noted.

2. How does L1 knowledge play an active role in the process of acquisition?

L1 is viewed as one of the resources learners have at their disposal, and the roles of which will be described alongside the cognitive mechanisms of acquisition. Thus it is important to note that in the present account, the use of L1 knowledge is, in principle, volitional in that whether or not it is adopted is at the discretion of the learner.

1.3 Outline of the thesis

In the following chapter (Chapter 2), I will begin by reviewing studies on conceptual representation (i.e. the acquisition of lexical competence) and automaticity, and discuss how these existing theories relate to the present study as well as their shortcomings in the context of SLA of adult learners. Building on the usage-based paradigm, a model which incorporates the use of L1 knowledge will be proposed. The construction of the model will be discussed in Chapter 3 and Chapter 4, in which the context-dependent properties of knowledge and the formation of conceptual representation will be elucidated. Subsequently, Chapter 5 will report on an experiment that investigates the performance mistakes of Chinese-speaking learner of Japanese to verify the theoretical claims put forth in the previous chapter. Finally, implications of the present study will be concluded in Chapter 6.

2. Literature review

Since the present work aims to illuminate the cognitive process of acquisition, only models that are concerned with the trajectory of development will be discussed. The two main streams of research that are particularly relevant to the present work include: 1) the studies of bilingual mental lexicon (Section 2.1); and 2) functional-developmental usage-based approaches to language acquisition (Section 2.2). The first stems from the psycholinguistic approaches to investigating the representation of lexical knowledge in bilinguals. The second—including cognitive linguistics approach and connectionist theories—derives from constructivist views of language acquisition. The two disciplines dominate respectively in the domains of L2 acquisition and L1 acquisition respectively, and differ greatly in methodologies and theoretical groundings. Meanwhile, they share a common interest: to explore language representation and acquisition. Upon review of studies related to acquisition, Section 2.3 will turn to look at literature on automaticity.

2.1 Bilingual mental lexicon

An important line of research in the studies of L2 vocabulary acquisition is the study of lexical representation and development of bilingual lexicon. Such studies are motivated by the inquiry as to how bilinguals access lexical information, and how such knowledge is represented in the minds of bilinguals. Drawing on the fact that bilinguals can translate most words from one language to another, most bilingual processing models assume that while phonological and morphosyntactic forms differ across languages, meanings and concepts are largely, if not completely, shared (Pavlenko, 2009).

There are two main groups of methodologies used in the research of bilingual lexicon. The first is the conventional psycholinguistic approach which relies on a range of reaction-time tasks, such as lexical decision, semantic priming, sentence priming, picture naming, translation, word association, and the Stroop interference task. The central issue in these studies concerns "the mapping of form to meaning" (Kroll & De Groot, 1997: 169). In other words, these tasks have been used to address issues such as whether L1 and L2 words in the bilingual lexicon share a

common conceptual representation, factors that affect the speed of lexical access, the strength of interlingual linkage, etc.

One of the most influential works that dominate the discussion of bilingual lexicon is the Revised Hierarchical Model (RHM) proposed by Kroll and Stewart (1994) (Figure 1). The RHM is derived from two main findings in research on interlingual connections: (1) novice learners are faster in translating from L1 to L2 than picture naming in the L2 (Chen & Leung, 1989; Kroll & Curley, 1988); and (2) L2 to L1 translation is faster than L1 to L2 translation. These findings were taken to indicate that in the initial stages L2 words are more strongly connected to their L1 translation equivalents than to concepts, thus conceptual access of non-fluent bilinguals is generally characterized by *lexical mediation* through L1. As L2 proficiency increases, the links between L2 words and conceptual store become stronger and direct links (*conceptual mediation*) become more readily accessible during lexical access.
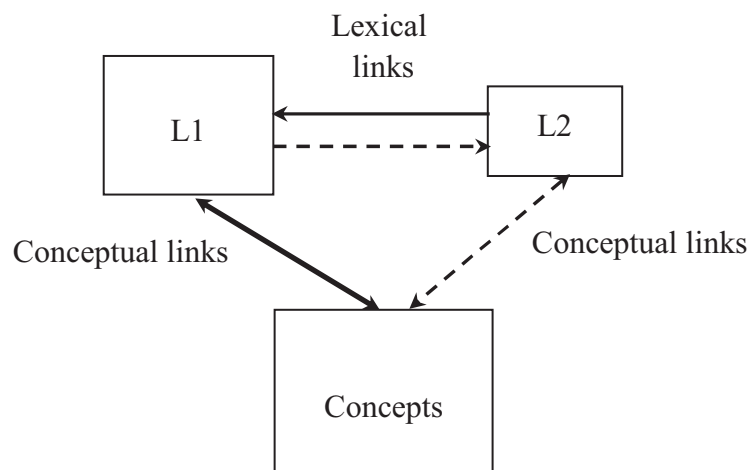
Figure 1. The Revised Hierarchical Model (RHM) (adapted from Kroll & Stewart, 1994)

The advantage of the RHM is in capturing the developmental change in linking between L2 and L1 word forms and lexical concepts. However, it is often criticized on the ground that the unified nature of the conceptual store assumed in the RHM has totally set aside the conventional wisdom that most words do not overlap perfectly between two languages (see, e.g. Pavlenko, 2009). This problem is largely inherent in methodology, as these studies typically favor concrete words that appear to have readily available translation equivalents (e.g. Chen & Leung, 1989; Kroll &

Stewart, 1994; Potter, So, Von Eckardt, & Feldman, 1984). Thus, the model has limited applicability as it reflects only the case of conceptual equivalence. In this connection, the reliance on L1 equivalents is arguably a behavior induced by the use of decontextualized materials, in both picture naming and translation tasks. In practice, there are numerous situations that call for somewhat non-literal translations which elude one-to-one correspondence. The RHM fails to account for how bilinguals work out a target-like expression when given a context in which the target word cannot be directly derived from its so-called L1 equivalent.

Another most frequently cited model is the Distributed Feature Model put forth by De Groot (1992) (Figure 2). The model reflects the central finding that concrete words and cognates are translated faster than abstract words and non-cognates (De Groot, 1992, 1993, 1995; De Groot, Dannenburg, & Van Hell, 1994). The speed of translation is interpreted as a higher degree of meaning overlapping between the L1 and L2 words, and the results are taken to suggest that representations of concrete words and cognates are largely shared across languages while representations of abstract words share fewer semantic features.
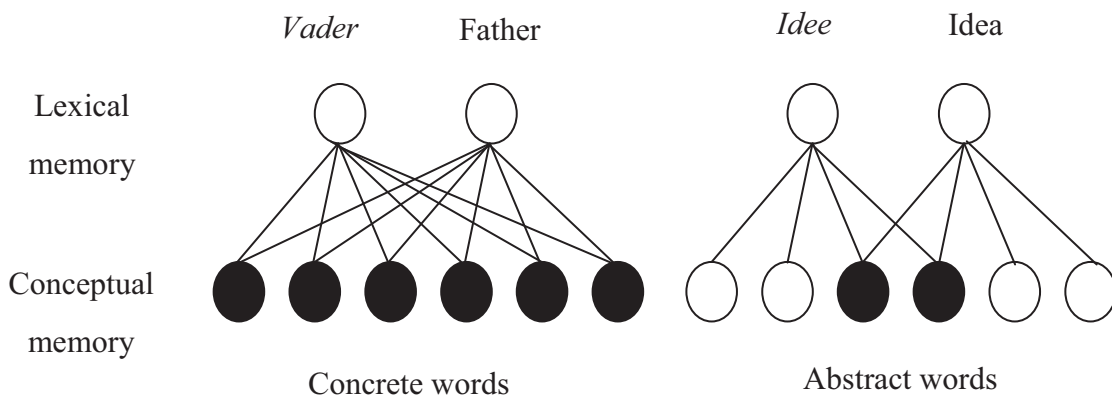
Figure 2. The Distributed Feature Model (adapted from De Groot, 1992, 1993)

Contrary to the RHM, the primary strength of the DFM is the attention to cross-linguistic differences. As Pavlenko (2009) pointed out, however, one of the biggest weaknesses of DFM is the lack of a developmental component. The second weakness is the reliance on the notion of feature-based approach i.e. "a set of necessary and sufficient conditions that determine the meaning of a word" which has

received a great deal of criticism because it fails to account for prototype and context-dependence effects (Pavlenko, 2009).

Another problematic nature of the DFM is the equation of the strength of interlingual connections with the degree of meaning overlapping, and the assumption that concrete words share meaning simply because they are translated faster than abstract words. In this paradigm, faster reaction times are taken to indicate stronger connections between word forms, and stronger connections are, in turn, attributed to shared meanings. In reality, however, the strength of interlingual connections may be affected by a number of other factors, including levels of L2 proficiency of the subjects, the context of acquisition, similarity of word forms, etc. (De Groot, 1995, 2002; Kroll & Tokowicz, 2005). While concrete nouns may seem at first sight to possess close translation equivalents across languages, there is now ample evidence in the literature showing that concrete words may differ across languages in terms of the referents they refer to (Ameel, Storms, Malt, & Sloman, 2005; Malt, Sloman, Gennari, Shi, & Wang, 1999; Malt, Sloman, & Gennari, 2003).

In view of such inborn defects of the traditional psycholinguistic approaches, researchers see the need to develop a new approach in the study of bilingual lexical representation. The second line of research in this area has only emerged in very recent years and distinguishes itself from the previously discussed approach by adopting various cross-cultural methods including naming tasks, categorization, sorting, and narrative elicitation tasks. The primary inquiry posed by this group of researchers is no longer about whether L1 and L2 possess independent or shared concepts, but about how words are mapped to real-world referents in the representation. In other words, researchers aim to address the cross-linguistic differences across languages by focusing on the use of words in context.

Drawing on the empirical evidence provided by these studies, Pavlenko (2009) posits three types of conceptual equivalence based on the relationship between linguistic categories.

1. Conceptual equivalence or near equivalence
   - Linguistic categories mediated by language A and B share both structure and boundaries, i.e. the same way of categorizing a range of referents.
   - Example:

- Cup: *tas* (Dutch) – *tasse* (French)
- Dish: *bord* (Dutch) – *assiette* (French)

2. Partial (non)equivalence

- Two or more categories of one language are subsumed, fully or partially, within a larger category in another language, or termed as nesting.
- Example:
  - *jar* (English) nested within *frasco* (Spanish) that also contains bottle and container in English.
  - *revnost'* (Russian) nested within *jealousy* (English) which also contains envy-arousing situations.

3. Conceptual non-equivalence

- A linguistic category of one language which does not have a counterpart in another language.
- Example:
  - *Fortochka* (Russian), a small window panel on top of a window that can be opened to let some air in, does not have an English counterpart.
  - *Privacy* and *frustration* (English) do not have a Russian counterpart.

These conceptual relationships, according to Pavlenko, have a significant impact on the bilingual mental lexicon. Pavlenko (2009) argues that in order to account for target-like performance, cross-linguistic differences and language-specific features need to be identified. Building on the RHM (Kroll & Stewart, 1994) and DFM (De Groot, 1992), Pavlenko proposed the Modified Hierarchical Model (MHM) (Figure 3) which retains the strengths of these models, namely the developmental progression from lexical to conceptual mediation embedded in RHM, as well as the notion of shared and partially shared representations central to the DFM.

The differentiation between shared features and language-specific features underscores the essential cross-linguistic differences that need to be recognized and acquired by learners in order to perform in accordance with the target language. Pavlenko (2009) further suggested three kinds of L2 learning that correspond to each type of conceptual relationship:

1. Conceptual equivalence requires the linking of the new L2 word forms to the already-established L1 concepts. In short, *conceptual transfer* of L1 knowledge is viewed as the main process involved.

2. Partial (non)equivalence involves *conceptual restructuring* in which readjustment of the category structure and boundary is made, either by expanding or narrowing them in accordance with the L2 constraints.

3. Conceptual non-equivalence requires *conceptual development*, which is the formation of new multimodal representations that allow speakers to map new words onto new-world referents.
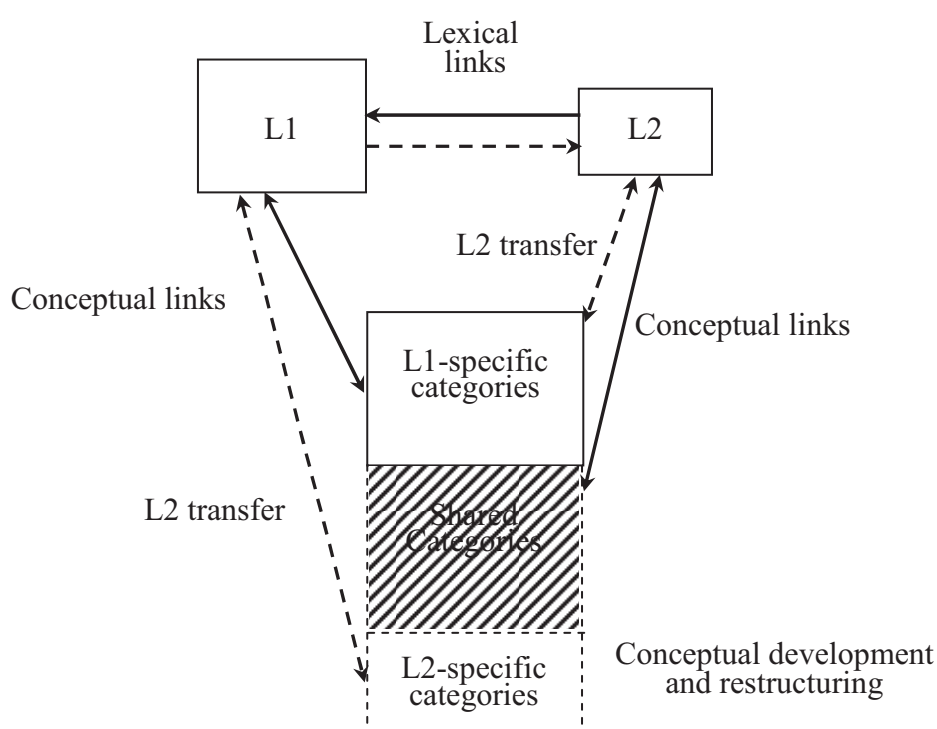
Figure 3. The Modified Hierarchical Model (adapted from Pavlenko, 2009)

The MHM succeeded in illuminating cross-linguistic differences and brought to attention the fact that learners might encounter different levels of learning difficulty. Despite its contributions in bringing together the fruitful results of the recent cross-cultural research, it suffers from a fatal flaw by conflating linguistic analysis and mental representation. In this view, L1 concept is conceived as a necessary component in L2 acquisition, so far as a so-called L1 equivalence is available. Such assumption is based solely on comparison between languages, rather than being empirically sound by obtaining support from areas such as cognitive psychology and

neuroscience. A major consequence of such learning view is that its applicability is strictly limited to classroom learning where learners typically make full use of dictionary definitions, word list technique, and other explicit vocabulary learning methods. The model cannot account for cases where learners encounter the words in a naturalistic environment and are inclined to encode the words as an association with the communicative situations in which the words are encountered, rather than with an L1 equivalent. In practice, however, it is inappropriate to assume that learners invariably resort to L1 equivalents in the course of acquisition. Thus, it could be reasonably argued that models of SLVA should incorporate the use of L1 knowledge, meanwhile retaining the flexibility to accommodate cases in which learners do not activate the L1 equivalents even when available. In other words, instead of being placed at the core position, L1 conceptual knowledge should be treated as one of the resources which may or may not be utilized at the discretion of the learner.

Another internal weakness of the MHM is the validity of the notion of conceptual equivalence. According to the procedures described in Pavlenko's (2009) work, the equivalence relationship seems to depend exclusively on whether the words in question share the same referent(s). This is problematic as it disregards the perspectival property of language. For instance, a "dog" fulfills both the conditions as an "animal" and "*ikimono*" ("living thing"), but this does not make the English word "animal" and the Japanese word "*ikimono*" equivalent to one another. At the same time, knowledge crucial to target-like performance such as register, frequency of use, and connotation seems to be excluded from the MHM. An example of this is the Japanese word "*gyuunyuu*" and "*miruku*" ("milk") which both correspond to the Chinese word "*niu2 nai3*". Although these words may coincide well in terms of the referents they refer to, the different connotations they carry are crucial in understanding the fine-grained difference between the two Japanese words (i.e. a matter of accuracy).

Another example that illustrates the issue of equivalence is the referential situation "my hair is falling out" when expressed in Japanese and Chinese.

- Japanese: *kami no ke   ga   nukeru*
           hair   is   fall out

- Chinese: *tou2 fa4   diao4   le*

                     hair   fall   (indicates completion of an action)

Both expressions above refer to the very same referential situation. However, if the Chinese word "*diao4*" is viewed as a partial equivalence of the Japanese word "*nukeru*" and constitutes a conceptual representation (for the L2 word "*nukeru*") in the mental lexicon of a Chinese-speaking learner of Japanese language, a considerable number of such representations (with different L1 equivalents) will be required if the entire range of usage of "*nukeru*" were to be acquired adequately. Memory burden will be massive especially when non-literal translation equivalents were to be included. For instance, while the word "*wei1 xian3*" ("dangerous") coincides with the Japanese word "*abunai*" in most typical usages, in a situation where a car is coming, it is common for one to warn others in Japanese using the expression "*abunai*" whereas in Chinese one usually exclaims "*xiao3 xin1*" ("watch out") in the above situation. It is unclear how the representation outlined in MHM accounts for such diverse usage that may, in many instances, diverge from the alleged L1 equivalent.

This leads us to another shortcoming of the MHM that is the lack of organization in a manner that conforms to the economy principle. According to the above discussion, not only is a single lexical item linked to multiple L1 equivalents; every L1 equivalent, likewise, will also be associated with a number of L2 words. This results in a highly complicated yet unorganized network which gives no consideration to efficiency. As a consequence, learners are most likely to undergo tremendous difficulty not only in retaining the vast amount of equivalents, but also in retrieving the correct piece of information (i.e. the appropriate lexical item that goes with an intended situation) out of such ill-managed conceptual store. The rigid restriction imposed by the linking with L1 equivalence inhibits learners from manipulating the input for innovative use and to yield maximum productivity. In short, the MHM has largely reduced the learning of L2 to a pure matter of memory which has largely disregarded learners' ability to assimilate knowledge by means of generalization, induction, and other cognitive procedures documented in the literature.

The last weakness of the MHM worth mentioning here is the inability to account for the development of automaticity[2]. As mentioned in the introduction, any acquisition model that does not take into consideration the dimension of performance is never a complete one. Description of competence alone is unable to portray the full picture of lexical knowledge, and there is rarely a clear-cut boundary between competence and performance.

To summarize, despite the differences, all three models discussed above share the common assumption that conceptual representation is shared between L1 and L2. This is an oversimplified view of L2 acquisition—the fact that learners are able to perform translation does not imply that it is how they acquire or encode the words. A plausible explanation offered by the connectionist approaches (Ellis, 2001) is that such linking is simply one of the kinds of association formed within the knowledge network, due to the frequent co-activation of the L2 words and the corresponding L1 equivalents. In cases where the producible output goes beyond what was input (particularly by an L1 equivalence), it is theoretically inappropriate to assume that learning entails merely the establishment of a linking between the new word form and the old concept. L2 acquisition—even though may be facilitated at a large extent by previous knowledge of the L1—deserves to be studied as a unique process in its own rights, and the mechanism it involves has yet to be established in the literature to date.

2.2 Usage-based approach to language acquisition

The fundamental basis that underlies constructivist views of language acquisition can be summarized as follows:

"Constructivist views of language acquisition hold that simple learning mechanisms operating in and across the human systems for perception, motor-action and cognition as they are exposed to language data as part of a communicatively-rich human social environment by an organism eager to exploit the functionality of

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[2] The notion of conceptual link and lexical link adopted in the RHM and MHM refers to the strength of linking between form and meaning, but not the speed of concept retrieval per se (from the intended preverbal message).

language is enough to drive the emergence of complex language representations." (Ellis, 2003, p. 33)

The tribes of constructivism may include connectionists, functional linguists, emergentists, constructivist child language researchers, and others. With regard to the usage-based perspective shared by these approaches, Ellis further states that:

"They hold that structural regularities of language emerge from learners' lifetime analysis of the distributional characteristics of the language input and thus that the knowledge of a speaker/ hearer cannot be understood as a grammar, but rather as a statistical ensemble of language experiences that changes slightly every time a new utterance is processed. Consequently, they analyze language acquisition processes rather than final state or language acquisition device." (Ellis, 2003, p. 33)

A key feature that characterizes usage-based models is the intimate relation between linguistic structures and instances of use (Kemmer & Barlow, 2000). A usage-based model maintains that the speaker's linguistic system is fundamentally grounded in "usage events", defined as "instances of a speaker's producing and understanding language" or in other words, "an utterance characterized in all the phonetic and conceptual detail a language user is capable of apprehending" (Langacker, 2000: 9). Such instances form the basic constructs of a speaker's linguistic system. Usage events are specific in nature in that linguistic utterance always involves specific referent in specific context. The linguistic system, often called schema, emerges from these specific instances, and more general patterns are gradually abstracted from repeated encounter with similar instances. The intimate relation between linguistic representations and the instantiations they are grounded in has a significant consequence. The linguistic system is not static but constantly reshaped with use throughout one's life. Usage events are central to the ongoing restructuring of the system, as noted by Kemmer and Barlow (2000, p. ix), "language productions are not only products of the speaker's linguistic system, but they also provide input for other speakers' systems (as well as, reflexively, for the speaker's own). (…) Thus, usage events play a double role in the system: they both result from, and also shape, the linguistic system itself in a kind of feedback loop".

Langacker (1988) has identified three key characteristics of a usage-based model: it is maximalist, non-reductive, and bottom-up. In distinct contrast to innatist

theories of language acquisition, Cognitive Grammar denies the minimalist view that is based on economy and instead argues for a massive and highly redundant linguistic system. The conceptual representation can accommodate both unanalyzed exemplars and complex language structure that results from analytical treatment of these listings. These specific expressions are cognitive entities in their own right whose existence is not reducible to that of the general patterns they instantiate (Langacker, 2000). In the bottom-up linguistic structure, the specific instances taken from experience are privileged over the general pattern abstracted from the specific, because "however far this abstraction may proceed, the schemas that emerge spring from the soil of actual usage" (Kemmer & Barlow, 2000, p. ix). Another central property of usage-based model is the frequency of instances. Since the system is in principle an experience-driven one, frequency plays a fundamental role in its structure and operation (Kemmer & Barlow, 2000).

Some of the strengths of usage-based models include 1) being computationally implementable (see, e.g., McClelland & Rumelhart, 1986; Rumelhart & McClelland, 1986); 2) congruent with findings from neuroscience (see Lamb, 2000); 3) achieving a high degree of conceptual unification, in that a few basic mechanisms are operative in all domains of language structure (from phonology to syntax and semantics/ pragmatics) traditionally handled separately and in very different ways; and 4) the fact that it includes a variety of factors such as memory, problem-solving ability, general knowledge, as well as full apprehension of the social, cultural, and linguistic context is consonant with the psychological reality of language acquisition.

2.2.1 Basic mechanisms of language acquisition from a cognitive linguistics viewpoint

Langacker (2000) has outlined several processes integral to the use of language which can also serve as a framework for acquisition. The first of these, the basic mechanism that underpins the use of language as a symbol, termed as *symbolization*, entails the association of conceptualizations with the mental representations of observable entities (i.e. symbols) such as speech, gestures, and written discourse.

Next, the process that is responsible for the efficiency of language use, namely *abstraction*, involves the generalization of the commonality inherent in multiple

experiences to form an abstract structure. In this process, only recurring facets of the individual usage events are reinforced, and thereby contribute to the emerging structure. A special case of abstraction that characterizes language acquisition is termed as *schematization*, in which generalization operates at varying levels of "granularity" (Langacker, 2000: 4). At any level, the formation of *schema* requires that the differences be suppressed or abstracted away by comparing the structures with lesser precision and specificity. Thus high level schemas possess the capacity to accommodate a more diverse range of usage events than low level schemas do.

A third basic mechanism is *entrenchment* (in Langacker's terms) or also known as "routinization" and "automatization". Entrenchment correlates with the frequency of use. The recurrence of a pattern increases the ease of activation and thus facilitates the re-occurrence of a comparable pattern. Through repetition, even a highly complex structure can become easily elicited and reliably executed. Entrenchment is perceived as a progressive process that begins from the first occurrence of a novel structure and moves towards the state of full conventionalization with every repeated encounter.

Also fundamental to cognition is the operation of *categorization* which involves the comparison between an established unit, i.e. the standard, and a novel target. This mechanism is essential for the introduction and establishment of new units in the existing structure. Categorization takes place with ease when there is no discrepancy between the two structures, i.e. when the target conforms well to the linguistic convention embodied in the standard. The act of categorization is also possible when the two structures in question do not stand in a straightforwardly elaborative relationship. In this case, the disparity between the categorizing structure and the target needs to be registered via what is termed as *extension*.

Another basic mechanism is the combination of simpler structures to yield a more complex structure called *composition*. It involves the integration of two or more component structures to form a composite structure. It is important to note that the actual value of the resulting structure is not simply the addition of that of its constituent parts in isolation; rather, the composite structure ought to be regarded as an entity in its own right which manifests qualities that are more elaborate and that

diverge from its components. The process of composition will be further discussed under the heading of chunking in Section 2.3.4 and 4.3.2.

2.2.2 Conceptual structure

Through production and comprehension, new usage events are continually incorporated into the representation by means of categorization. The resulting structure is an elaborate network comprising any number of instances on the lower levels. The category that is most frequently invoked (i.e. gains entrenchment) to categorize a new target becomes the *prototype*.

Different targets vary in the extent to which they conform to the specifications of the standard (i.e. the categorizing structure). In cases where there is some discrepancy between the standard and the target, compromise has to be made by abstracting away the conflicting features of the standard. This can be achieved by extracting a higher-level schema with an "upward" growth induced by the "outward" growth of a network due to *extension* from a prototype, as diagrammed in Figure 4.
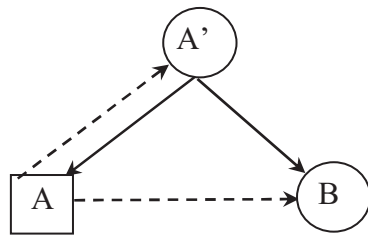
Figure 4: Extension and schematization (adapted from Langacker, 2000)

The resulting linguistic categories are usually complex, developing from prototypical structures via such processes as extension, the extraction of schemas, and the articulation of coarse-grained units into more specific ones. Each structure and each categorizing relationship has varying degrees of entrenchment and ease of activation. The target of categorization in each case lies at a certain "distance" from the standard, depending on how far the target conforms to the specifications of the standard or how many features are violated. The notions of entrenchment and distance are indicated in Figure 5 by the thickness of boxes and length of arrows respectively. The dashed arrows indicate extension relationship, whereas the solid

arrows are used for the relationship between a schema and a more specific structure that instantiates it.
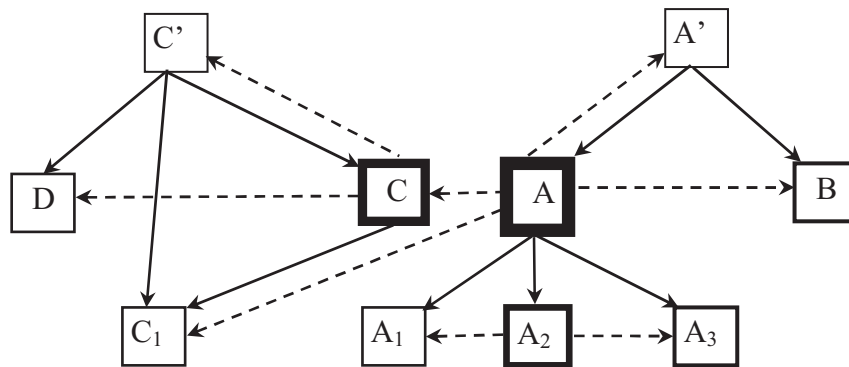
Figure 5. Complex category network (adapted from Langacker, 2000)

It has to be borne in mind that "it is not the linguistic system per se that constructs and understands novel expressions, but rather the language user, who marshals for this purpose the full panoply of available resources" (Langacker, 2000, p. 9). The use of language reflects how a situation is conceptualized by the speaker, and this conceptualization is governed by perspective and attentional focus. Such property of usage-based model has the advantage to be adapted to SLA to account for individual difference among learners, particularly differences attributable to L1.

To summarize, cognitive linguistics arises from the study of nature of language, especially the dynamics of usage, language representation, and acquisition of language. While many of the cognitive procedures postulated in this field also apply to the study of L2 acquisition, some adaptation needs to be made to accommodate the peculiarities of adult learners. For one thing, while the cognitive linguistics account assumes a large inventory of instances underlying normal language use of L1 speakers, it is not always the case for L2 learners who are able to make use of various analytical skills. In effect, the use of L2 is not inevitably accompanied by entrenchment, and even when it is, the effect of automatization may be brought about by transfer of previous knowledge rather than by reinforcement owing to repeated occurrence. To put it briefly, the bottom-up nature inherent in the cognitive linguistics account may need to be reconciled with the top-down nature that characterizes L2 acquisition of adult learners by taking their cognitive abilities and other available resources into careful consideration.

2.2.3 Connectionist approach

While the core issue in Langacker's work is the construction of conceptual representation based on perceptual and imagery modalities, connectionist approach is concerned with modeling the totality of language knowledge. Connectionist approaches to language acquisition place a major emphasis on association which occurs at all levels of representational systems. The most basic principle of association is the Law of Contiguity: "Objects once experienced together tend to become associated in the imagination, so that when any one of them is thought of, the others are likely to be thought of also, in the same order of sequence or coexistence as before" (James, 1890: 561, cited by Ellis, 2001: 42). Ellis (2001: 42) further states that "nodes which are simultaneously or contiguously attended in working memory tend to become associated in the long term."

Frequency plays a crucial role in the formation of association. According to this view, the principle underlying the learning of sequences of words (frequent collocations, phrases, and idioms) is very much the same for the learning of sequences within words (i.e. lexical items) (Ellis, 2001). In addition, well-rehearsed strings can also readily form association with other representations, yielding a range of interesting properties. As described in Ellis (2001, p. 44), "links with conceptual representation underlie reference and grounded semantics. Links with frequent local collocations underlie syntax and idiomatic meaning. Links with local and more distant lexical neighbors underlie lexical semantics. Links between L2 and simultaneously active L1 representations underlie translation and language transfer effects. These simple associations amass over the learner's language input history into a web of multimodal connections which represent the complexities of language".

Connectionist models have the advantage of being computationally implementable in principle. In a simulation of L1 and L2 acquisition of vocabulary called Latent Semantic Analysis (LSA) (Landauer & Dumais, 1997), the connectionist network was exposed to words (as sequences of letters) along with other frequently co-occurring words and no other information. During the process being trained by text samples from over 30 thousand articles, the network organizes itself into a system which allows it to perform at the level of an advanced ESL learner when tested with the synonym portion of the Test of English as a Foreign

Language (TOEFL). The strength of connectionist approach lies not only in the simple learning processes it offers that could account for the complex product of language acquisition, but also in its ability to explain how automaticity develops (see next section). In other words, the problematic dichotomy between syntax and lexis, competence and performance no longer exists here. At the same time, it provides a comprehensive account for the acquisition of all aspects of vocabulary knowledge, many of which are what elude bilingual lexicon theories. However, although connectionist approach serves as a powerful tool for the studies of L1 acquisition, it might offer only partial applicability to the studies of SLA. As described above, one of the most important features that characterize connectionist models is frequency, from which complex knowledge network and various emergent properties arise. In the case of L2 acquisition generally characterized by deficiency of input and low frequency of use particularly during the early stages, learning mechanisms need to describe how learners make use of other resources available to them to compensate for these "handicaps".

2.3 Theories of automaticity
2.3.1 Rule-based model

One of the most frequently cited theories that account for the development of automaticity is the ACT* Theory established by Anderson (1980, 1981, 1982, 1983, 1989). The rule-based approach maintains that automaticity is brought forth by faster application of rules known as *declarative knowledge* (also known as factual knowledge or propositional knowledge). Take for example the case of a Japanese L2 learner who is taught an inflection rule concerning the change of a verb form that ends with '-*ku*' into '-*ita*' to form a past tense (plain form). Such knowledge is flexible but carries heavy costs of execution in terms of processing time and working memory capacity. With practice, declarative knowledge is gradually transformed into the attention-free *procedural knowledge* (know-how) and the learner no longer needs to resort consciously to the explicit rules. To put it in other words, the declarative knowledge either decays from the memory or becomes no longer retrievable as the execution becomes automatic. This process of conversion, known as *proceduralization*, is postulated as one of the learning mechanisms that

contribute to the development of automatic performance. Another key mechanism, namely *composition*, refers to the creation of macro-productions or chunks to ease processing. A typical example for this is long numerical sequences such as telephone numbers that are often chunked into units of two or three digits for better retention.

The model not only accounts for the speeding up of the same procedures, but also includes establishment of new procedures that invoke qualitative changes brought about by three *tuning processes*: *generalization*, *discrimination*, and *strengthening*. Generalization and discrimination operate in a rather complementing way in refining the knowledge structure, in which the former widens the scope of rule application whereas the latter narrows it. The mechanism of strengthening is responsible for the strengthening of better rules and weakening of poorer rules. It should be noted that strengthening in this model refers to the increased likelihood of a rule being selected and thus should not be equated with the establishment of stronger associations such as that suggested by connectionist accounts.

Anderson's theory of cognition offers considerable applicability in probing the acquisition and fluency of L2 (Crookes, 1991; Kormos, 2006; Schmidt, 1992). Several studies that investigated the development of L2 speech production processes have attempted to relate their findings to Anderson's ACT* theory to account for the changes in fluency. Towell, Hawkins, and Bazergui (1996), for instance, studied the performance of a group of advanced learners of French before and after a year spent in the target language environment. Based on a detailed quantitative and qualitative analysis, they argued that the increase in fluency (as measured by mean length of run) is attributable to the proceduralization of syntactic and lexical knowledge. An experimental study documented by DeKeyser (1997) that investigated the acquisition of grammar rules and vocabulary (of a miniature linguistic system) in laboratory settings also found learning patterns that can be best explained by the ACT* model. Other empirical support includes that provided by a study of slips of tongue found in the speech of Dutch learners of English (Poulisse, 1999). By comparing the pattern of slips made by learners at three different levels of proficiency, Poulisse concluded that the proficiency-related differences mainly arise in the processes of lexical access, morphological encoding, and phonological

encoding, and can be ascribed to the lack of automaticity (i.e. not yet proceduralized).

Despite its strengths and implications for our understanding of L2 fluency, the ACT* model is not without problems. It is most often criticized on the grounds that in SLA not every instance of procedural knowledge is converted from declarative knowledge; some may be acquired directly or through the transfer of L1 procedural knowledge (Raupach, 1987). In addition, Bialystok and Bouchard Ryan (1985) also pointed out that it "conflates the representation of knowledge with access to that knowledge" (Schmidt, 1992, p. 365), as generalization and discrimination are more concerned with accuracy and development rather than speedup of retrieval.

2.3.2 Item-based model

An approach that is radically different from Anderson's rule-based theory is found in item-based theories of automaticity. One of the best-known formulations of item learning approach is Logan's (1988a, 1988b) instance theory. In contrast to the ACT* model which attributes increasing fluency to reduction in the amount of attentional resources required due to the more rapid execution of algorithm (rule), instance theory assumes that the learning mechanism responsible for automatic processing is memory retrieval. That is, the use of an algorithm is replaced by a single-step direct retrieval of the solution from memory. Logan argues that there is a competition between rule-based processing and memory-based processing. Initially, the number of instances encoded in memory is very small, thus performance needs to be carried out on the basis of an algorithm. However, with constant practice and accumulation of stimulus (number of instances), it becomes likely that an item is retrieved before the algorithm runs off.

Instance theory has not been applied widely in the SLA literature, partly due to its divergence from the conventional wisdom which assumes that fluency relies upon the internalization of rules (Schmidt, 1992). Robinson and Ha (1993) have tested Logan's instance theory against the algorithm-based model using L2 grammaticality judgment task. A group of ESL learners were presented with an explicit rule of the morphological criteria for dative alteration in English and then carried out a drill with non-sense verbs illustrating the morphological criteria. Mixed

results were obtained from the study, suggesting that algorithm-based mechanisms and memory retrieval are not mutually exclusive, but both might contribute to the development of automaticity. Several other studies on skill acquisition also established that instance theory alone cannot account for skill learning that involves transfer of training or generalization. Logan's own findings have exhibited some form of algorithm speedup (Logan, 1988b), and Logan and Stadler (1991) have produced evidence for a category comparison strategy (Hintzman, 1986) in a series of memory search experiments.

A less radical item-based theory that may provide a more satisfactory explanation for these results is the exemplar-based random walk model proposed by Palmeri (Nosofsky & Palmeri, 1997; Palmeri, 1997). By incorporating the central notions of Logan's (1988a, 1988b) instance theory and generalization (based on Nosofsky's generalized context model, 1984, 1986), Palmeri argues that memory retrieval is similarity-based, and that responses are determined by the competition between the target category and the other categories. High within-category similarity facilitates automatization, whereas high between-category similarity impedes the development of automaticity. Since the exemplar-based random walk model is more flexible in that it allows for memory retrieval of not only identical but also similar stimuli, it seems to be more applicable to language learning than is traditional instance theory.

2.3.3 Restructuring theory

McLaughlin (1990) has taken a position similar to that of Anderson by arguing that both automaticity and restructuring are fundamental to second language acquisition. Restructuring refers to the qualitative changes that occur in a learner's internal representation, equivalent to Anderson's tuning processes. Following Karmiloff-Smith (1986), McLaughlin suggests that the automatization of speech production process first takes place, followed by restructuring. McLaughlin cites the well-documented U-shaped behavior (Kellerman, 1983) as the primary evidence for the interplay of automaticity and restructuring. In the initial stage, learners exhibit production that conforms to target-like norms, but appear to lose what was previously known as organization is imposed on the internal representation

(Karmiloff-Smith, 1986; Lightbown, 1983). Such restructuring is usually triggered by the introduction of new components into the present knowledge system. This often causes destabilization of performance and decline in accuracy, and it will take some time before the correct form reappears. McLaughlin argues that skilled action results from the shift in strategies, as learners develop more efficient procedures. The process involves a transition from the reliance on exemplar-based strategies to the more abstract, rule-based representations.

However, similar to ACT* theory, the notion of restructuring introduced by McLaughlin has a limitation of being more relevant to the development of linguistic competence, but bearing less significance as a possible mechanism underlying the development of fluency (Schmidt, 1992). The model proposes a dynamic trajectory of acquisition that matches the U-shaped behavior, by incorporating both the development of automaticity and refinement of the internal conceptual representation (i.e. restructuring) as two possible outcomes of practice. However, the underlying cognitive mechanisms that contribute to automaticity are not described in the study. In addition, the developmental pattern suggested by McLaughlin that automatization precedes restructuring also remains questionable as that might not always be the case, as is suggested by other literature.

2.3.4 Chunking theory

Following the ACT* model (Anderson, 1983), Servan-Schreiber and Anderson (1990) further refined the concept of *composition* by proposing the theory of *competitive chunking* with a single mechanism. They trained subjects on strings (i.e. sequence of letters) generated by a miniature artificial grammar, demonstrating that chunking was the primary mechanism responsible for learning. Kormos (2006) pointed out that the chunking theory is comparable to Logan's instance theory, in that the acquisition of chunks (also known as prefabricated patterns or formulaic expressions) can be seen as a competition between the use of production rules to assemble linguistic units from scratch, and the direct retrieval of memorized phrases (i.e. chunks). As a consequence of this view, "at the beginning of the language-learning process the application of rules is faster because linguistic units are not yet sufficiently encoded in memory. With experience and practice, the speed of memory

retrieval exceeds that of rule-based processing, and formulaic expressions are accessed in memory as one unit" (Kormos, 2006, p. 46.). In her discussion, chunks are viewed as units of language that are stored and retrieved as one single unit, which can function and be produced in very much the same way as other lexical items in the lexicon.

Another model of chunking that operates on similar principles is proposed by Newell and Rosenbloom (Newell, 1990; Newell & Rosenbloom, 1981; Rosenbloom & Newell, 1987), in which they posit a single set of common learning mechanisms, i.e. chunking, that underlies the full range of human cognition, including memory, production, and comprehension. The theory was explored using a cognitive architecture called Soar developed by Laird, Newell, and Rosenbloom (1987). Although the Soar system has yet to make simulation in the domain of language learning, Schmidt (1992) claims that the model, owing to its hierarchical properties, may be applicable for modeling speech production in which utterances consist of formulaic units of various lengths (i.e. different levels of chunking), ranging from longer stretches of phrases (e.g. pragmatic functions) to individual lexical units (e.g. words).

In SLA, there is research evidence supporting both the viewpoints that learners can begin with chunks and only deduce rules from them at later stages (Bolander, 1989; Myles, Mitchell, & Hooper, 1999), and vice versa. For instance, Widdowson (1989) has argued that in real-time communication, learners generally rely on their repertoire of prefabricated patterns rather than assembling utterances from scratch by resorting to rules. On the other hand, Wray (2002) suggests that the opposite is also possible, that is, rule-based processing may dominate initially, but gradually shifts to direct retrieval of memorized chunks as more word sequences become stored as one unit in memory with practice. This view is reminiscent of Logan's instance theory, in that memorized units gradually take over the application of rules for retrieval.

It is argued here that chunking theory is not exhaustive in accounting for the development of automatized performance. The principle that underlies chunking theory is that "lexical items that often occur together tend to form chunks" (Kormos, 2006, p. 46). In other words, it places an emphasis on the co-occurrence of forms

and is less concerned about the semantic aspects (see, e.g., Servan-Schreiber & Anderson, 1990). However, in the case of SLA, one can easily imagine the situation in which a learner encounters a word repeatedly in a series of similar communicational settings and thus becomes able to produce the word with ease in those contexts than the others. Such learning effect cannot be described adequately using the chunking theory because automaticity, in this case, does not involve the use of a prefabricated sequence. Meanwhile, such phenomenon is not completely incompatible with chunking theory, since in both cases the ease of retrieval arises from the non-analytical or exemplar-based nature of the representation.

In addition, chunking theory appears to be more applicable to the case of young L2 learners who are less cognitively sophisticated and thus are more dependent on the memorization of formulas (see, e.g., Bohn, 1986; Hakuta, 1976; Wong Fillmore, 1976). Adult L2 learners, on the other hand, are generally more analytical and efficiency-driven owing to their cognitive maturity, particularly their ability to attend selectively (Miller, 1985). Therefore, chunking theory provides only partial account for their automatic performance—for instance concerning the use of pragmatic expressions (e.g. Blum-Kulka, 1989; Yorio, 1980)—and arguably not for a large portions of other lexical items, because learning would be too inefficient as chunking requires a lexical item to be retained in multiple different combinations. Such overlearning is less favourable in the case of adult L2 learners who are often faced with limited input and time to acquire the L2, coupled with stringent task demands. This paper thus argues that chunking theory is more relevant in later stages of acquisition, where learners have come to a state in which overlearning no longer contradicts the economy principle.

2.3.5 Strength theory

The strength theory postulated by MacKay (1982) offers a pre-connectionist account for the development of fluency in speech production. Parallel to the connectionist viewpoint, it holds that representations are encoded in the strengths of a set of connections consisting of different units that are used to provide overlapping but nevertheless distinct representations. The association among the connected nodes strengthens with consistent practice and activating a node at any level in the

system primes connected nodes. For speech, such hierarchy consists of propositional, conceptual, syntactic, lexical, syllable, phonemic, and muscle movement nodes. MacKay's model derives evidence from a number of translation experiments in which German-English bilinguals practiced translation either from English to German or from German to English and then demonstrated nearly perfect transfer of skill when requested to perform translation tasks with the same sentences in the opposite direction. Similar to the connectionist approach, strength theory argues the importance of specific instances (lower level components), as system learning only occurs once a substantial amount of experience with specific items has been stored.

2.3.6 Summary

In summary, two main groups of automaticity theory exist: rule-based and item-based approaches. The core concept that underlies rules-based approaches to automaticity is that the access of rule becomes more automatized with practice and no longer requires attention during retrieval, whereas in item-based approaches, acceleration of access is attributed to the direct retrieval of the solution as more exemplars are acquired. This can also be taken to include the learning effect of formulaic expressions, that is, access becomes faster as more and longer chunks (i.e. single units of solution) become available in the lexicon.

Both rule- and item-based theories are supported by extensive empirical evidence. For instance, instance theory draws on data gathered from a range of experiments involving lexical decision and alphabet arithmetic (Logan, 1988b). However, while the reproduction of identical stimuli is possible in these tasks or even in the production of inflection rules, identical stimuli rarely occur during concept retrieval unless when a word is used to refer to the very same referent (e.g., when one's utterance is recited). Traditional rule-based approaches, on the other hand, maintain that knowledge *always* starts out from a set of explicit rules (i.e. declarative knowledge). Such assumption does not necessarily reflect all cases of acquisition of concept, in which rules could be *emergent* properties resulting from the accumulation of specific instances, according to usage-based perspectives of language acquisition. In other words, in the case of SLA there is a possibility that L2

learners first acquire individual exemplars, and only develop a more abstract representation (i.e. the rules) on the basis of such knowledge.

Even though more recent theories of both rule- and item-based approaches have indicated a mode of convergence, they remain rather far from being reconcilable. A comprehensive account of automaticity in SLA calls for a model that combines the strength of both streams of theory that complement one another.

3. The formation of contextual knowledge

The acquisition model proposed in the present study adopts Langacker's (2000) distinction between "usage event" and "schema". For ease of reference, the terms "contextual knowledge" and "integrated knowledge" will be used as approximate equivalence corresponding to "usage event" and "schema" respectively. Both contextual knowledge and integrated knowledge comprise the conceptual structure.

Taking a position parallel to Langacker's, the present study argues that contextual knowledge underlies the accuracy of the conceptual representation. Such knowledge is acquired from context, including the communicative surrounding (i.e. non-verbal context) as well as linguistic surrounding (i.e. verbal context) in which the word in question is encountered or embedded[3]. The model proposed here draws on findings of the usage-based theory (developed by Tomasello in the field of constructivist child language) as its theoretical underpinning. At the same time, by incorporating the potential use of L1 knowledge and other cognitive abilities possessed exclusively by adult L2 learners, the study postulates a cognitive mechanism that accounts for how L2 learners acquire adequate contextual knowledge from context as the first step toward securing accuracy.

3.1 Introduction

One of the chief goals shared among L2 learners in vocabulary acquisition is none other than to be able to express oneself in an extensive range of communicative settings in a target-like manner. Accuracy, in terms of the productive aspects, requires learners to possess knowledge of the range of applicable referents of a word (Nation, 2001; Pavlenko, 2009). While word list consisting of the L2 forms and the corresponding meanings (usually in the form of an L1 equivalent or a brief definition) may allow a considerable number of words to be memorized effectively (see, e.g., Prince, 1996), it has little to offer when it comes to usage-related aspects such as when and where a word can be used, thus carries the disadvantage of low reliability as far as accuracy is concerned. This leads researchers to shift their focus

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[3] However, only studies of the latter will be reviewed in since the literature has mainly focused on the effect of verbal contexts on vocabulary acquisition.

to learning from context. However, given the lack of a cognitive model that illuminates the role of context in the acquisition of vocabulary competence, learning from context remains a controversial issue (as will be discussed in Section 3.2), and it is hard to establish a set of theory-based guidelines for practitioners as well as learners as to the amount and the kind of context needed for adequate acquisition.

In order to avoid unnecessary misinterpretation, there is a need to draw a clear distinction here between using context clues to *guess* the meaning of an unknown word, and using context to *learn* the meaning of words in the presence of definition. Learning may take place on both occasions, but the contextual conditions that facilitate respective purposes may differ greatly. Motivated by the fact that both context and dictionary definition (or word meaning presented in any explicit form) serve as potential resources to aid the acquisition of meaning, the present study focuses on *learning* from context where definition is also at the learner's disposal.

3.2 Literature review

The importance of context in SLVA has been a controversial issue over many years. On one hand, a number of scholars have pointed out the critical importance of context or contextual knowledge in vocabulary acquisition (Beheydt, 1987; Miller, 1999; Pavlenko, 2009; Sternberg, 1987); while on the other, empirical studies conducted to verify the effects of context have resulted in mixed findings, providing only partial support to the above claim (Dempster, 1987; Gipe & Arnold, 1979; Laufer & Shmueli, 1997; Lawson & Hogben, 1996; Nist & Olejnik, 1995; see Nation, 2001 for review). Some of these findings indicate a superiority of translation learning over context learning (Dempster, 1987; Laufer & Shmueli, 1997; Lawson & Hogben, 1996) while others reveal the positive effect of enhanced context (Nist & Olejnik, 1995).

One of the major problems of the above studies lies in the assessment method, where recall of word meaning has been the most commonly used indicator of learning gains (e.g. Dempster, 1987; Laufer & Shmueli, 1997; Lawson & Hogben, 1996). All such task requires learners to do is to provide a superficial meaning, and does not concern whether or not learners are able to use the words appropriately. Thus learning, in this sense, is arguably more effective when the form-meaning

linking is retained via direct mnemonic strategies such as the keyword technique using paired list (see Nation, 2001). The nature of such meaning-recall tests renders rich contextual information unnecessary or sometimes even detrimental; as a result, learning in context may fail to demonstrate any clear advantage over translation learning. On the other hand, learning gains in aspects of knowledge such as applicable referents, situations of use, and finer aspects of meaning which are likely to benefit from context (and which elude translation learning) have been largely underestimated.

Parallel to this is the issue of sensitivity of test (Nagy, Herman, & Anderson, 1985). Learning from context is often a cumulative process which results in small but positive gains in each encounter (Nagy, 2001; Nation, 2001). Therefore, test methods that see the goal of one meeting as an explicit correct meaning may fail to account for the small amounts of learning, much more so when meaning is not provided and needs to be inferred from the context during the learning session. This shows that experiments designed to compare word list mode and context mode (without providing meaning) by testing learning gains using meaning-recall test are clearly biased favoring the former over the latter (e.g. Prince, 1996; Lawson & Hogben, 1996).

Another plausible explanation to account for the inconsistency in the reported findings is that not all contexts are equally informative (Beck et al., 1983), or more precisely, the pervasive lack of a well-defined criterion as to 'what' determines the usefulness of context. For instance, in an experiment conducted by Laufer and Shmueli (1997) to compare the learning effect of different modes of vocabulary presentation with varying contextual information, an 'elaborated text' (allegedly the most informative mode) was illustrated by 'People willingly adopted this image and it was a stereotype seized upon *avidly* (target word) by the film industry as well' (see also Nist & Olejnik, 1995 for similar comparison of learning effect between manipulated contexts). However, how qualitatively different such context is compared to the original text (one of the four modes) 'It was a stereotype seized upon *avidly* by the film industry' in clarifying the meaning and use of the target word 'avidly', is questionable. A similar concern has been expressed by Nist and Olejnik (1995) regarding the fuzziness of how 'strong' (a notion equivalent to

'elaborated' in Laufer and Shmueli's study) context needs to be to result in adequate mastering of the meaning of a word. Without first establishing a basis to effectively control the independent variable, i.e. the quality of context, we are almost certain to obtain results of limited reliability.

The usefulness of context can be underestimated not only when the quality of context is not carefully controlled but also in cases where the target words are concrete nouns and verbs that represent readily available, familiar concepts in learners' L1 (e.g. 'owl', 'apron', 'to sink' presented to French-speaking learners of English in Prince, 1996; see also Lawson & Hogben, 1996). Since an L1 equivalent alone is sufficient in demonstrating the referent, it is not surprising that an additional context fails to prove any significance[4].

Besides L1 conceptual knowledge, prior knowledge particularly intra- and inter-lexical knowledge may also have a significant impact on learners' readiness to learn a word. Intra-lexical knowledge refers to any previous knowledge of the use or meaning of a word, whereas inter-lexical knowledge refers to the state of acquisition of other conceptually related words. The lack of careful control of these factors will in turn affect the outcome of learning from context.

Therefore, in order to provide a solid ground to disentangle relevant debates, we need to first understand what a context potentially does to the cognitive state of a learner during the acquisition of meaning. The gap in literature in this respect reflects the prevalent practice in SLA that is resistant to the development and exploration of formal models and often opts for informal, metaphorical ones (Meara, 1997). Meara (1997), taking the example of experiments on the effect of reading on vocabulary learning based on the common-sense hypothesis that learners can acquire words from exposure to texts, made the following criticism:

"In some ways, research of this sort is a bit like a gardener planting seeds in a plot in order to confirm that they will grow into flowers. A good crop of daisies would indeed confirm the 'hypothesis', but it's not exactly thrilling science, and it

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[4] Although in Prince's experiment contexts were presented to subjects to *guess* the meaning of the unknown words, the result is arguably the same even if definitions are provided alongside, as suggested by Dempster's (1987) study.

doesn't do much to help us understand the process of germination, or how this process is affected by various relevant environment factors." (Meara, 1997, p. 113)

3.3 Objective of the chapter

The present chapter aims to develop a comprehensive theoretical framework that addresses the following research questions:

1. How is the basis of an accurate conceptual representation formed via the development of contextual knowledge, and how is such knowledge acquired?

2. How is the process of acquisition of contextual knowledge affected by components such as the provision of an explicit meaning (either in the form of definition or L1 equivalent) and the current state of lexical knowledge?

The present discussion will focus exclusively on the formation of contextual knowledge and begin by a detailed account of what constitutes accuracy, followed by how context and contextual knowledge play a role in this connection. Next, the cognitive process (i.e. instantiation) that governs the formation of contextual knowledge from context (as an input) will be illustrated. Finally, the interaction between instantiation and the current state of lexical knowledge will be described. All components involved in the present chapter are shown in Figure 6. It should be noted that this chapter does not address the problem of how learners acquire the more abstract conceptual knowledge (i.e. integrated knowledge); however, the contextual knowledge outlined here shall serve as the first step which forms the foundation of target-like conceptual knowledge.
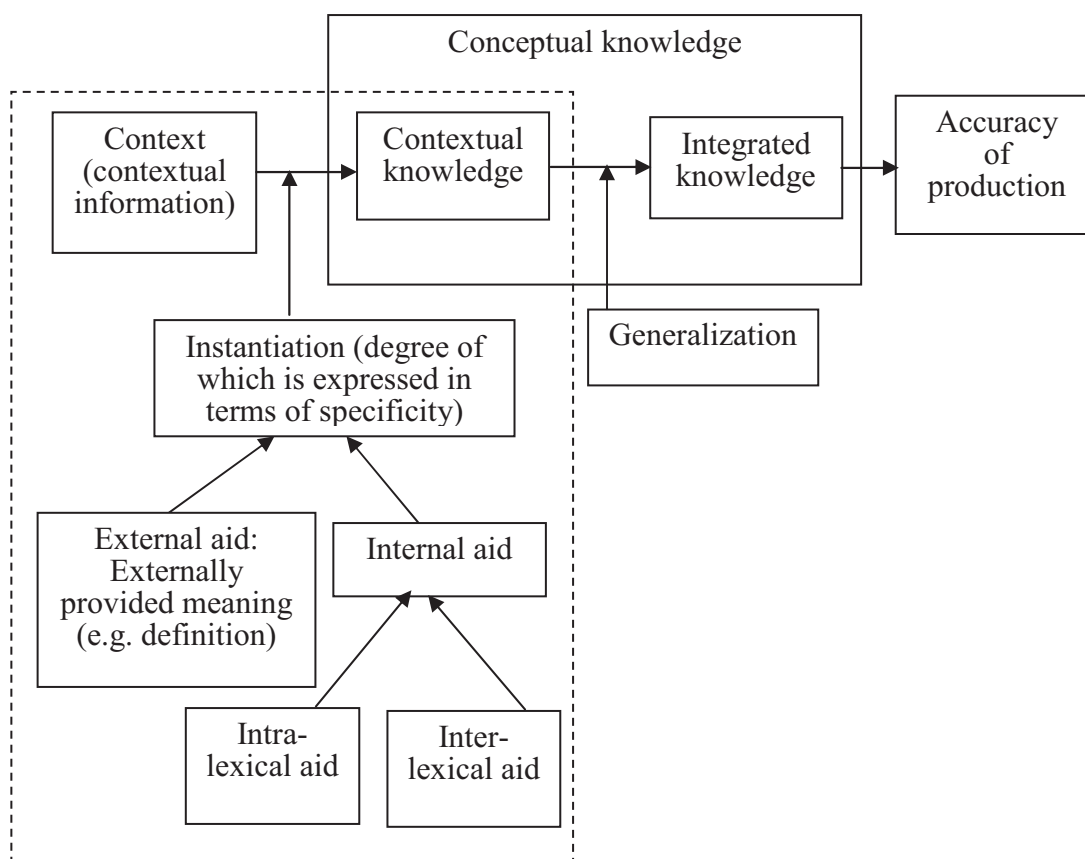
Figure 6. The formation of conceptual knowledge from context for a production-oriented goal (the main focus of the present chapter is indicated by the box in dashed line).

3.3.1 Gap-filling and 'specificity'

As stated in 3.1, the primary aim in the acquisition of concept is to attain the competence to apply the lexical item to a range of referents in a target-like manner (Matsuda, 2004; Pavlenko, 2009). According to this perspective, acquisition can be viewed as an ongoing process of gap-filling[5] of knowledge[6], and the failure to

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[5] In the present chapter, the term gap is used in a more narrowly defined sense to refer to 'a specific referential situation for which the learner lacks an expression'.

[6] The importance of gap-filling in acquisition has been demonstrated by Clark (1987) in her influential studies of children L1 acquisition. The Principle of Contrast put forth by Clark (1987) maintains that children reject multiple labels within a language and across languages, and fill gaps in their lexicon by assigning novel words they hear or by coining new words themselves. The notion of gap-filling has

comply with the norm will result in either underuse or overuse (also known as under-extension or over-extension, e.g. in Clark & Clark, 1977), as illustrated in Figure 7.

L2   Learner

A   B   C

L2 = the applicable range of a lexical item
Learner = the range of referents the learner has acquired
A = underuse   B = appropriate use   C = overuse
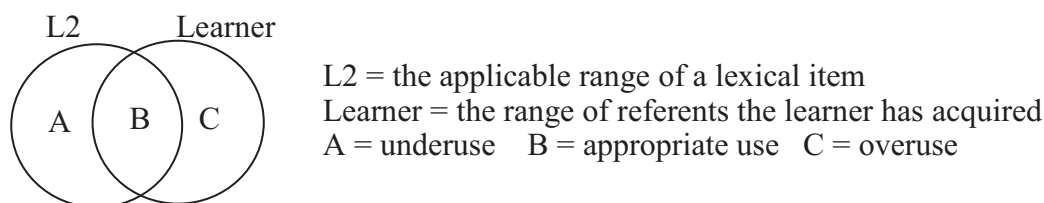
Figure 7. The state of acquisition of a lexical item

The L2 area is viewed as consisting of numerous real world situations or referents that can be expressed by the word, each of which constitutes a gap (can be pictured as a single tiny dot on the L2 area) which needs to be identified and acquired by the learner. As shown in Figure 8, any form of input that provides meaning of a word (including a definition, a synonym, a sentence, or a combination thereof) will encompass a certain range of assumed referents as a result of the learner's comprehension and interpretation, including referents transferred from L1 (in the case of an L1 definition or equivalent) or previously acquired knowledge of L2 (in the case of a synonym). Each of these inputs may vary in terms of the area they cover, and may fall either within or beyond the permissible scope of the word. The larger the coverage area is, the broader the range of application becomes, however, at the cost of risking a higher possibility of erroneous production (due to overuse) when the boundary is crossed (Figure 8a).

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also been widely recognized in the domain of SLA (see, e.g., Schmidt & Frota, 1986; Long, 1996, Long & Robinson, 1998; Swain, 1995), but has not been explored extensively in formal models of L2 acquisition.
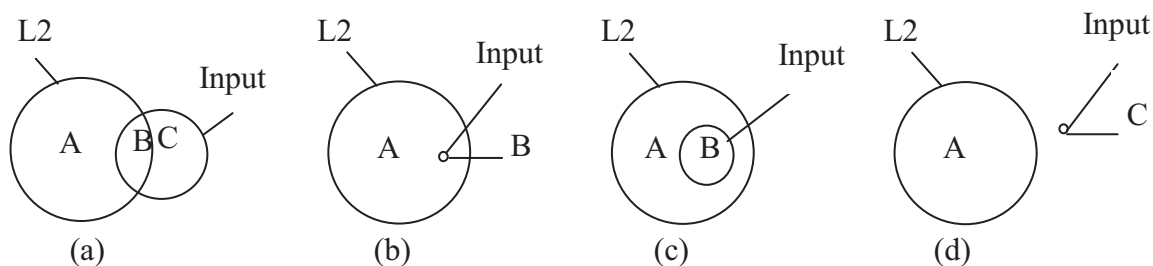
L2 = the applicable range of a lexical item

Input = the range of referents the learner acquired (assumed) from a particular input

A = underuse   B = appropriate use   C = overuse

Figure 8 (derived from Figure 7). The acquisition of the scope of use of a lexical item (from a particular input), compared in terms of specificity and accuracy.

The hypothesis follows that the accuracy of gap-filling can be increased if the learner's comprehension of an input is highly specific[7], which is made possible via learning from context. The notion of 'specificity' proposed here is determined by the extent to which ambiguity of the situation referred to by the context in question is eliminated (based on the learner's perception). Specificity increases with the decrease of degree of freedom, i.e. the number of possible interpretations that could be made about a given context. Consider an English speaking learner of Japanese learning the Japanese adjective *fushinsetsu* (defined as 'unhelpful; unfriendly; inhospitable', according to Kenkyusha's New Japanese-English Dictionary 5th Edition) using the following dictionary example (*ibid.*).

1. *Oshiekata ga fushinsetsu na no de, ano sensei no jugyou ha sappari wakaranai.*

'He teaches very badly and I don't understand the lectures at all.'

The context, with the help of the given meaning 'badly; unhelpful', may evoke various interpretations including erroneous ones (Figure 8a, area C) such as 'an unskillful teacher who doesn't explain well' and 'a teacher who is unable to provide

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[7] This, however, does not equate specificity to accuracy, considering the possibility of a specific yet inappropriate interpretation, as shown in Figure 3d.

a proper solution to his student's doubts' which will lead to inappropriate usage if the learner attempts to use the word in these situations[8]. According to this view, the above context could be more of a hindrance than a help and thus it can be said to contain minimal additional value compared to the provision of a definition alone without context.

In contrast, consider one who encounters the word *fushinsetsu* in the following context and looks up the meaning ('badly; unhelpful') in the dictionary.

1. *Seito ni totte najimi no nai muzukashii senmon yougo wo takusan tsukatteiru ue ni, nanno hosoku setsumei mo shinai. Fushinsetsu kiwamarinai.*

'It is so unkind of the lecturer to use lots of difficult technical terms which the students are not familiar with, without making any effort to explain them.'

From this context, the learner will now be able to rule out possibilities such as 'bad teaching owing to an inadequate knowledge' that arise in the first example, by narrowing down the interpretation to the lecturer's inattentive attitude (Figure 8b). Note that such context does not necessarily need to appear in full utterance, nor does the learner need to understand every word in the utterance. It is about how much information concerning the situation in which the word is used is available to the learner that helps him to rule out inappropriate interpretations, regardless of whether such information is being expressed verbally or not. It is then justified that the richer contextual information is, the more efficiently elimination can be carried out.

However, a context may evoke different representations when presented to different individuals, thus the effect of context cannot be presupposed without taking into account the cognitive process learners undergo in interacting with the context. In short, it is the contextual representation that learners form from a given context, and not the context per se that imparts specificity. Therefore, there is now a need to

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[8] One might argue that learners are also capable of making a single, specific interpretation from the given context. However, this is unlikely to happen as inference is not supported by sufficient reliable cues; and even if it did happen, the interpretation is most probably a deviated one, based on the same rationale.

look beyond context and explore the internal cognitive process that governs the formation of contextual knowledge.

3.3.2 The process of formation of contextual representation

3.3.2.1 Instantiation

It has been long established in the field of psychology that in language comprehension people employ context and their knowledge of the world to narrow the meanings of words encountered in context, a process that has been termed instantiation (Anderson, Stevens, Shifrin, & Osborn, 1978). For instance, given the sentence 'the fish attacked the swimmer', most people will instantiate this fish as a shark (Anderson, Pichert, Goetz, Schallert, Stevens et al., 1976). Consequently, the instantiation for the word 'container' will not be the same in 'the container held the apples' and 'the container held the cola' (Anderson & Ortony, 1975). Anderson et al. argue that the mental representations people generally construct for words in context are 'richer and more detailed than dictionary definitions' (1978, p. 149). This view accords with the notion of usage-based theories which hold that:

"The context-dependent nature of linguistic production and understanding entails, among other things, the inevitable underspecification of linguistic forms. Language does not hold or "convey" meaning per se, but simply provides *cues* for meaning construction in context. A conceptualization occurring in a specific instance of language use is evoked by the linguistic forms used, but is necessarily far richer than any information specifically associated with those forms; such information (…) is merely an abstraction from experience or use of the forms." (Kemmer & Barlow, 2000, p. xxi)

For the purpose of the present study, instantiation is viewed as the process in which specificity of referent is achieved; however, there seems to be varying degrees to which instantiation can be made. For instance, instantiation for 'container that holds the apples' may consist of a vague image representation of a rattan basket, but can also contain more elaborate details such as the attachment of a handle, the pattern of the mesh of the basket, size, etc. This may not be an issue of concern for Anderson and his colleagues in their investigations on L1 speakers, as any instantiation made is readily confined within the scope of one's already established

concept (i.e. presumably in accordance with the norm). However, in the case of L2 learners, there is a possibility that instantiation may deviate from the applicable area of a word (Figure 8a, area C). In that case, the extent to which instantiation is performed may be crucial to the accuracy of the contextual knowledge formed. For instance, given the context in example 1, suppose that a learner instantiates 'a teacher teaching extremely fast', but fails to infer further details such as the teacher's intention or the situation of the class. As a consequence, inappropriate usage may occur if the learner uses *fushinsetsu* to express a situation such as 'an advanced lecture in which difficult syllables are coupled with fast teaching but presented in a well-organized manner'. This is because *fushinsetsu* is only applicable to situations where 'one disregards the needs of the person(s) he is dealing with' (for instance, 'a teacher teaching fast without considering the ability of his students', or 'a teacher who does not conduct his lecture systematically, leaving out important details here and there'), and the failure to include such feature in instantiation may lead to inappropriate production. Such issue does not arise and is not addressed in Anderson's studies, as the inquiry is about how speakers (mainly native) who already possess knowledge about the word in question instantiate in the process of comprehension. It is exactly this conceptual knowledge that L2 learners lack which needs to be built up from context.

In this study, the term instantiation will be used to refer to the process in which learners interpret a context by identifying the particular referent or situation being referred to, in line with the definition in Anderson et al. (1978). Meanwhile, it differs from the literature in two ways, first in the sense that instantiation is not an all-or-none process but allows a gradation expressed in terms of the degree of specificity; and second, the subjects in the present study possess no conceptual knowledge concerning the word in question. In brief, the inquiry of the present study is about how L2 learners *learn* from context via instantiation, as opposed to that of Anderson et al. (1976; 1978) about how L1 speakers *comprehend* a context via instantiation. Note that it is also imperative for L2 learners to comprehend a context in order to learn from it; however, the resources that L1 speakers utilize in instantiation are not available to L2 learners, rendering the mechanism significantly different. In order to construct the learning process of L2 learners, it is useful to look

at that of L1 learners under similar condition, in which learners are at a state to derive and acquire meaning from context.

3.3.2.2 The cognitive processes

In his influential study on young children's acquisition of their L1, Tomasello puts forth a social-cognitive model known as the usage-based theory of language acquisition, suggesting that language acquisition emerges as a product of the desire to communicate and to participate in various social interactions (Tomasello, 2003). The foundational process involved in word learning consists of components depicted in Figure 9.
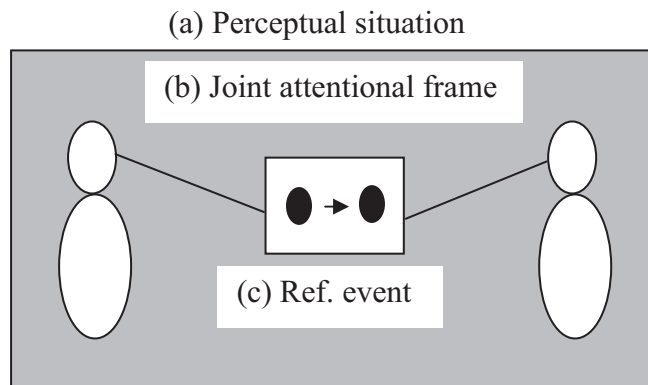
Figure 9. The basic adult-child communication situation: (a) the perceptual situation (not relevant to utterance); (b) the joint attentional frame (immediate relevance); and (c) the event being referred to linguistically (Tomasello, 2003).

The child must first establish some form of common ground with an adult, known as the joint attentional frame, and then within this frame be able to understand the adult's specific communicative intention in order to determine the adult's intended referent in using a particular linguistic item. Take for example, a study conducted by Akhtar et al. (1996) with a setting in which a child, her mother, and an experimenter were playing together with three novel objects. The perceptional situation of the child includes, besides the toys and the participants, many other things in the room. The joint attentional frame is those novel objects and activities that the child and the adults know are part of the attentional focus of both of them. As the mother left the room, a forth object was brought out and the child and the experimenter played with it, noting the mother's absence. When the mother

returned, she looked at the four objects and exclaimed 'Oh look! A modi! A modi!' Following the mother's gaze, the child now discerned the mother's focus of attention to the four objects, and within this newly established joint attentional frame, inferred that the mother is referring to the fourth object by determining that it was new to the mother and thus likely to elicit excitement.

There is no reason as to why Tomasello's model cannot be applied to L2 learning under similar circumstances. However, while Tomasello's subjects (i.e. young children) rely solely on intention reading to infer meaning from a communicational context, adult L2 learners are armed with previously learned concepts in their L1, besides being capable of employing the social-cognitive approach as described above. This enables L2 learners to make use of L1 definitions to learn from brief examples provided by dictionaries or textbooks when learning takes place in settings where genuine communicative interaction is scarce, particularly in a foreign language environment.

Drawing on the studies of Anderson et al. and Tomasello, the present study postulates that L2 learners instantiate via a two-step process, consisting of: (a) the formation of background knowledge (also known as function readiness, see MacWhinney, 1987); and (b) the identification of the referential situation. The first step is derived from the 'perceptual situation' in Tomasello's model, but differs in the sense that in the current framework, background knowledge encompasses a wider range of sources, including a similar experience in the past or anything that is beyond an immediate perceptual situation but which the learner is able to visualize. This is justified by the fact that in the case of L2 learners, since their focus of attention can be directed by previously learned words (including L1 knowledge and L2 synonyms) and linguistic descriptions (as will be illustrated in the second step), they shall not be confined to an immediate perceptual situation. However, the underlying principle remains the same—in order to be able to correctly infer the referential situation in a particular context, one has to first acquire nonlinguistic knowledge that embodies the concepts involved (Tomasello, 2003). For instance, consider the following example of the word *fushinsetsu*.

2. *fushinsetsu-na toriatsukai setsumeisho*

'A user-unfriendly instruction manual'

Examples of background knowledge required for the above context include 'a thick manual without an indication of content giving users a hard time searching for a desired information', 'the lack of illustration to guide assembly of the product', 'a manual written solely in English yet targeted for a community whose English is not the common language' and plenty others. Example 1 above, on the other hand, requires the learner to have experienced 'a teacher who is inattentive to the needs of his students' by, for instance, having attended the same lecture as did the speaker who produced the utterance, and having shared mutual feeling. These perceptual situations form the basis of production, from the viewpoint of an input producer; and the basis of comprehension, from the viewpoint of an input receiver. The kind of knowledge required at this stage is neither substitutable by nor obtainable from any form of explicit description—knowing a full description of 'tapir' simply cannot compare to knowing how the animal looks like. In cases where the word represents a concept that is non-existent in the learner's previous knowledge, he will need to acquire new knowledge which may include visual (mental imagery), auditory (sound), and kinesthetic (sensory-motor) information and may even need to undergo cultural learning.

As previously discussed, the extent to which instantiation is performed is expressed in terms of specificity, according to the view of the present study. In order to account for the degree of specificity in the process of instantiation, our perceived world is depicted as an entity comprising of numerous elements, and instantiation is viewed as a process of identifying the elements being referred to (hereinafter termed as 'relevant element'). Relevant elements are contextual components that are related to the use of a word in a particular context. It is important to note, however, that the present discussion is by no means arguing for a set of a priori 'necessary and sufficient elements', considering the fact that the use of a word is not attributable to a set of rigid dimensions but the criterion is usually fuzzy and dynamic, as demonstrated by Labov (1973) in his classic study with the word 'cup'. Rather, the current view posits that as more elements are instantiated, not only are chances of erroneous interpretation reduced, at the same time more information becomes available for further manipulation in the subsequent processes of acquisition (such as generalization, as will be discussed in Section 3.3.4). Instantiation may contain

not just the so-called core meaning but all the information that specifies a given word, including how formal the word is, the subtle nuances or connotation it carries, and other constraints of use (see La Heij, 2005 for a similar line of argument). It is the rich conceptual representation formed in this stage that accounts for target-like performance.

The notion of relevant element is employed here to demonstrate that the absence or indetermination of such element will result in a higher degree of freedom for interpretation (i.e. lower specificity) thereby increasing the possibility of misinterpretation. Inadequacy may also arise if the wrong elements are instantiated (as a consequence, the relevant elements remain absent from the learner's perspective), despite the high specificity. The basic process of instantiation illustrated in the form of element is shown in Figure 10, and conditions that contrast an adequate instantiation with an inadequate one are depicted in Figure 11. 'Irrelevant elements' are elements of which presence has negligible effect on the accuracy of knowledge.
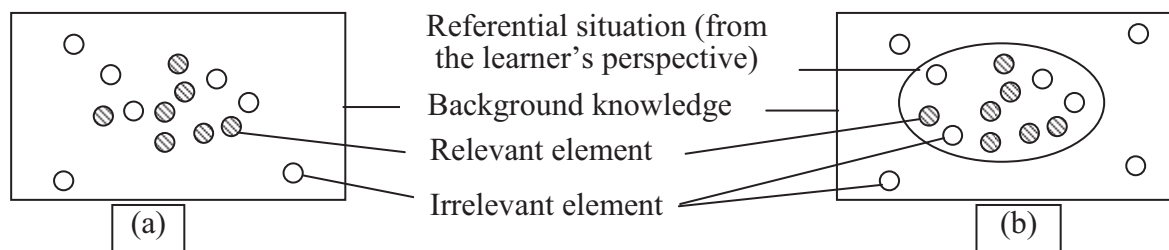
Figure 10. Instantiation consisting of 2 steps: (a) the formation of background knowledge, and (b) the identification of the referential situation.
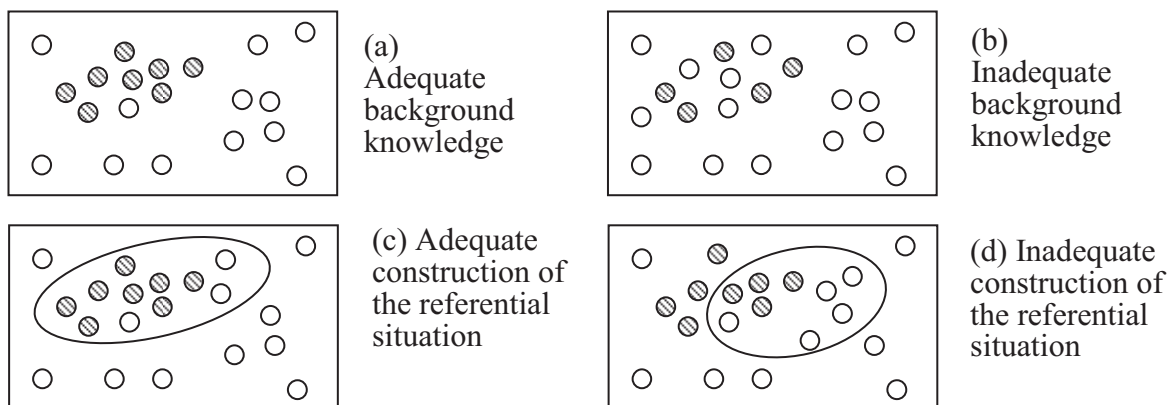
Figure 11 (derived from Figure 10). Sub-steps of instantiation in an adequate and inadequate condition.

Building on the basis of background knowledge (Figure 10a), the second step (Figure 10b) involves identifying the referential situation symbolized by the target word in a context. This corresponds to the identification of the speaker's intended referent within a joint attentional frame illustrated in Tomasello's framework, except that L2 learners are not restricted to intention reading as the only means to infer meaning—they may make use of meanings provided externally e.g. word definition or verbal description to assist instantiation. This is to say that L1 knowledge plays an important (but not exclusive) role at this stage following the hypothesis that, if an L1 translation of a minimal context is sufficient to confine any and all possible interpretations to the permissible scope of the word, less specificity is required (Figure 8c). On the contrary, if deviated interpretations cannot be effectively eliminated by an L1 aid (Figure 8a), a higher specificity is required and thus more elements need to be instantiated (resulting in a representation as shown in Figure 8b).

In example 2, as there is no readily available L1 equivalent or translation that could lead to the precise instantiation, the learner needs to identify the referential situation that matches the context, for instance "the teacher's lack of consideration for his student's ability and learning needs"[9]. However, if the learner mistakenly infers the intended situation as "the teacher's intentional act to assert his academic superiority over his students" or "a deliberate use of difficult technical terms to perplex the students on purpose", instantiation (of the word *fushinsetsu*) becomes inadequate as these instantiations are related to *eraburu* and *ijiwarui* respectively rather than *fushinsetsu*, while the most essential component such as "the teacher's inattentive teaching" is omitted.

The presence of a communicative situation makes an important difference at this stage, first, in terms of the availability of a joint attentional frame. In a communicative context in which the speaker is referring to a person or event already known to the listener (learner), the referent is proximate and all the learner needs to

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[9] There may be more than one event contributing to the use of a word in a particular context. For instance, the teacher not only uses difficult terms but also teaches in a speed too fast for the students to catch up with. Each of these constitutes a specific referential situation.

do is to infer the corresponding referential situation within a narrow, immediate scope (i.e. the joint attentional frame). On the other hand, when learning occurs without a common ground shared between the speaker and the learner—including conversation about an event that is not known to the learner or learning from a non-communicative setting such as an isolated context provided by textbook or dictionary—the learner needs to make an extra effort to identify the referential situation out of an enormous storage of background knowledge (for instance, in the case of example 1). An analogy can be drawn between this process and bird-watching—it goes without saying that spotting a specific bird (i.e. the intended referent) captured in a bird cage (i.e. background knowledge in a narrower scope) is much easier than locating it from a bird sanctuary (i.e. background knowledge in a broader scope).

Second, an interactive communication provides the learner with an opportunity to enhance or fine-tune an instantiation made via negotiation for meaning (see Long, 1996) (Figure 12). This may take place in various forms. For instance, upon hearing an utterance containing an unknown word, the learner may make an inference about the speaker's intended referent, respond accordingly, and obtain either positive or negative feedback (on the instantiation of the unknown word) from the response or reaction of the speaker. The processes of instantiating and getting feedback are inevitable in an ongoing conversation because discourse always presumes the exchange of meaning, and the intended meaning needs to be interpreted correctly by the interlocutor. Other forms of negotiation may include seeking confirmation about the inference one made or requesting for clarification of meaning from the speaker, at the point of time the utterance was made. Both of these factors partly explain why acquisition is faster and less effortful in a second language than in a foreign language environment.

Importing
information
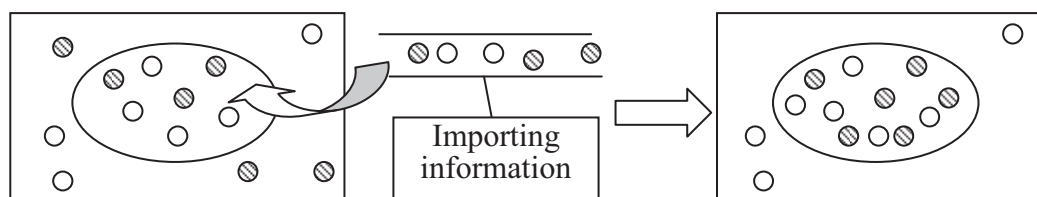
Figure 12 (derived from Figure 10). Importing information containing relevant elements to complete instantiation, either via negotiation for meaning or various top-down approaches (e.g. definition and L1 translation).

In addition, learner may also resort to the top-down approach such as using a dictionary definition (in either language) or an L1 translation as an aid to infer the referential situation in question (Figure 12). For instance, if provided with the definition 'inconsiderate to the needs of others', learner would be at a better position to correctly infer the meaning of the context in example 2 and even in example 1. It is important to note that an explicit definition facilitates but does not inevitably lead to the success of instantiation, although the quality of the definition may have some impact on instantiation, just as 'inconsiderate to the needs of others' may provide learners with better cues compared to 'unhelpful' (e.g. see Nist & Olejnik, 1995 for the effect of modified definition on learning).

Such top-down approach is demonstrated especially drastically in example 3, where any and all possible interpretations that the L1 translation 'a user-unfriendly instruction manual' could possibly evoke coincide with those of the context in Japanese. In this case, a transfer of contextual knowledge from the L1 concept is sufficient to ensure the accuracy of gap-filling even without making a specific instantiation, because the possibility of erroneous production is completely eliminated (Figure 8c).

An important point demonstrated in the discussion thus far about instantiation using *fushinsetsu* as an example is that the so-called L1 equivalents appear to vary greatly in the extent they assist instantiation. Based on Pavlenko's (2009) argument, the word 'badly' can be considered as a (partial) equivalence of *fushinsetsu* at least in situations such as 'a teacher who proceeds at his own pace without considering whether his students are catching up' and 'a teacher who uses lots of difficult terms which the students are not familiar with, without making any effort to explain them', in which 'he teaches badly' serves as a valid expression corresponding to its Japanese counterpart *fushinsetsu-na oshiekata*. There is one caveat: although being used to refer to the very same event or entity, the perspectives that these words express are not quite the same. The word 'badly' refers to the low quality of lecture

from which students do not benefit much, whereas *fushinsetsu* symbolizes aspects such as the teacher's lack of consideration for his students. Similarly, the word 'user-unfriendly' constitutes another (partial) equivalence of *fushinsetsu* (according to Pavlenko's argument), as far as the context *fushinsetsu-na toriatsukai setsumeisho* is concerned. However, unlike the previous example of 'badly', the perspectival dimension of expressions in both languages coincides well. For instance, the situation 'a thick manual without a clear indication of content' is symbolized in terms of the inconsiderate design of the manual causing its user unwanted confusion, both in the Japanese context and its English counterpart. A serious consequence of treating 'badly' and 'user-unfriendly' as equal (partial) equivalence of *fushinsetsu* in respective contexts is that, if the L1 linguistic context of example 3 (i.e. 'user-unfriendly instruction manual') is presented to a learner, he may be able to instantiate in accordance with the L2 context; yet for example 1, the instantiation resulting from the English translation most likely diverges from that of the Japanese context.

Therefore the validity of the notion of equivalence (and its classification) put forth by Pavlenko (2009) seems rather dubious particularly when considered from a learner's viewpoint as it can be misleading. What is more, the importance to establish such classification is questionable if the cognitive process of acquisition—rather than the relationship between languages—is the core issue of inquiry, unless one assumes that the process of acquisition depends exclusively on the kind of equivalence that characterizes the relationship between L1 and L2.

Upon discussing the mechanism of instantiation, it is then essential to address the question of how instantiation of a word is affected by the state of acquisition of other words as well as that of the target word.

3.3.3 Inter-lexical aid

Not all words are used at the same frequency, with some being more frequent than the others (Nation, 2001). This can be taken to mean that words vary in the range of contexts they cover, with high frequency words covering a larger range of use. Figure 13 shows the range of use of three words, presumably adjacent to one

another in the learner's lexicon (hereinafter referred to as 'adjacent word'[10]) in view of their perceived relatedness of meaning. The acquisition of adjacent words has a significant impact on the learning of the target word, as Clark puts it "what's already been acquired affects what gets acquired next" (1987, p. 23). The underlying principle is that two forms cannot be expressing the same meaning, and thus contrast (differentiation) between the known and unknown word helps to deduce the referent of the unknown word. In the following discussion, how prior knowledge of the adjacent words affects the instantiation of the target word will be described.
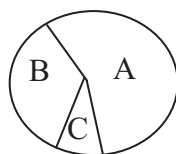
Figure 13. Words of different range of use.

It is posited that instantiation of a word can be enhanced with the help of its adjacent words, even when contextual information is inadequate. Suppose that in an attempt to instantiate a context for word C (Figure 13), the learner is faced with three possible interpretations which correspond to word A, word B, and word C respectively. If the scope of word A and word B is known, he will be able to determine the correct instantiation for word C by means of elimination. Take for example the following situation. Someone found a bottle of sunscreen in the trash can and asked, '*Kore ha tsukaikitta*?' ('Is this used up (to the last drop)?') Judging from the commonsense that one usually discards something only after using it up, the learner infers that the interlocutor is referring to the state of emptiness of the bottle that explains for why it is discarded (and not due to other reasons such as expiry date, etc.). However, he is unsure of whether the interlocutor merely intended to confirm that the bottle is emptied and so it is alright to discard it, or whether the

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[10] The term 'adjacent word' is opted against the word 'synonym' here to highlight the fact that which words are close in meaning (and are therefore likely to cause confusion) is largely a matter of perception which may differ among learners, and that these words may not necessarily coincide with what linguists classify as synonym.

interlocutor is trying to make sure that the sunscreen has been used up to the very last drop (say, to prevent wastage). Knowing that the interlocutor would have used the word *tsukaiowaru* (i.e. previously learned word; literally means 'finish using') instead of *tsukaikiru* (i.e. new word) if the former is intended, the learner may arrive at an inference that the interlocutor is indeed referring to the latter (i.e., 'used to the last drop'). Without such inter-lexical aid, the element 'completely (used up)' would have otherwise eluded the learner, rendering the instantiation incomplete. In this way, contrast between the previously acquired adjacent word and the target word helps to deduce the specific referential situation, and thus allows learners to discern the subtle and fine-grained meanings the target word carries.

It is worth noting that the effect of adjacent words is double-edged. In the event where the scope of word C is partially pre-empted by an overgeneralized adjacent word e.g. word A, even with a highly specific and accurate instantiation (of word C), the learner may still fail to perceive a gap for the word. As a consequence, the word may appear less salient to the learner and is thus likely to be rejected. By reinforcing the linkage between the instantiated referent and its correct form (i.e. word C), however, the boundary of the overgeneralized word (i.e. word A) will eventually be narrowed down and the resulting gap becomes readily filled by the target word. The potential of inter-lexical aid in assisting instantiation brings out an important implication: developmental sequences should be respected in the design of instructional materials (Pienemann, 1985), because the presentation of a particular word at different stages of acquisition is likely to bring about rather different learning outcome in terms of efficacy. The more frequent words tend to be retained more easily than the less frequent ones due to repeated encounter, but usage of which is often overextended until finer extractions are made. Therefore, it is reasonably argued that the less frequent words should only be introduced when learners are already familiarized with the high frequency words, so as to not only avoid excessive confusion but also to yield the best cost-effectiveness.

3.3.4 Generalization and intra-lexical aid

The discussion thus far concerns how learners might discern which object or situation a word is used to refer to in a particular context. This does not address the

issue of how learners infer the meaning of a new word more generally, in the sense of applying it to a broader range of referents beyond the original context. The process of generalization will be described in detail in Chapter 4[11]; however, how it relates to instantiation needs to be clarified.

As stated in the beginning of this chapter, if one is to acquire target-like conceptual competence to use a word across an array of appropriate situations, he needs to engage in generalization by means of forming a more abstract representation such as the image schema postulated by cognitive linguists (Lakoff, 1987; Langacker, 1987). Such cognitive representation is formed by extracting commonalities across a number of specific dynamic experiences (Mandler, 1992). Instantiation plays a crucial role in affecting the potential outcome of generalization by providing the necessary ingredients for such cognitive processing (Figure 14).
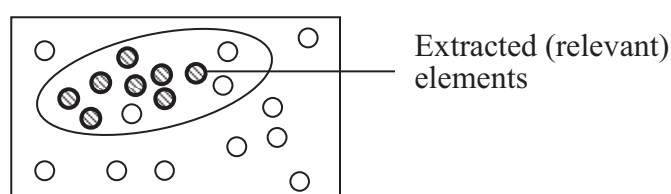
Figure 14 (derived from Figure 10). Extraction of relevant elements from an instantiated situation.

At the stage of instantiation, learners only need to identify the referential situation (by incorporating various relevant elements into perspective) but are not required to identify which elements go with the target word. It is the role of generalization to distinguish relevant elements from irrelevant ones and to extend their applicability[12]. For instance, understanding that *pasokon ga koshou shita* ('the computer is broken') is referring to the situation 'there is something wrong with the computer and Windows would not start at all' fulfills instantiation for not just the

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[11] Consequently, the issue of underuse (Figure 7) will not be addressed in the current chapter.

[12] The inter-lexical aid described in the previous section may also lend a powerful aid to extraction and generalization (see, e.g., Tomasello, 1992). See 4.2.2 for a more detailed discussion.

context of *koshou suru*, but also for *kowareru* in the context *pasokon ga kowareta* ('the computer is broken'). Thus, having instantiated correctly does not necessarily lead the learner to knowing that *kowareru* but not *koshou suru* is applicable to a collapsed bridge or a broken box, until he identifies the mechanical dimension of the computer as an element relevant to *koshou suru* and distinguishes other aspects attributable to respective concepts.

In other words, differentiation between words may remain incomplete until the learner undergoes generalization (in which the process of extraction is included). This carries an important implication: learning effect from context should be evaluated with care by taking into account the influence of generalization. For instance if contextual knowledge gained from context were to be measured via a production test, the learner must have engaged in some form of generalization during production (Figure 6), inevitably causing interference to the observed data. This is to say that, even if instantiation is adequate, erroneous production may still arise as a result of inadequate extraction of relevant elements during generalization, albeit presumably at a lower probability compared to when instantiation is incomplete (Figure 15).
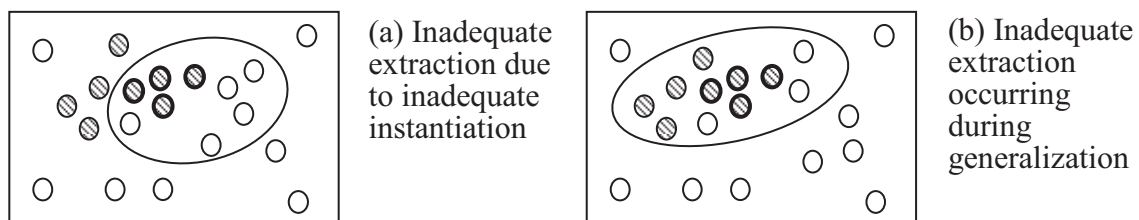
Figure 15 (derived from Figure 14). Inadequate extraction of relevant elements attributable to different causes.

Hence there is a need to draw attention to the issue that production error—although conventionally attributed to overgeneralization (e.g. Matsuda, 2000; Shirai, 1995; Sonaiya, 1991)—may also stem from instantiation, which is a key factor that has been largely overlooked in the studies of L2 acquisition. These two factors operate in rather opposite directions—instantiation contracts while generalization expands (the scope of referent). The consequence of bypassing the step of contraction is vast—the learner may not be able to achieve target-like performance

as the accuracy of gap-filling lies largely in specificity. Thus the success of instantiation is fundamental to (but does not imply) the success of generalization, considering that only those elements embedded in the instantiated situation are eligible for extraction and further manipulation. For instance, having instantiated that 'the teacher is being inconsiderate to his students by using difficult technical terms and that such act is giving the students a hard time to comprehend' is a prerequisite if elements such as 'inattentive to the needs of others' and 'causing unnecessary discomfort or confusion to that person(s)' are to be extracted. In contrast to that, with a poor context such as one in example 1, learner will only be able to encode the word *fushinsetsu* in the form of an L1 equivalent i.e. 'badly' due to the poverty of contextual information, inevitably resulting in non-target-like conceptual knowledge.

In Section 3.3.3, how acquisition of adjacent words assists instantiation of a word has been discussed. Apart from such inter-lexical aid, intra-lexical aid derived from generalized knowledge serves as another possible means to facilitate instantiation. For instance, if a learner was first presented with the context in example 3 followed by example 1, he might be able to utilize the information obtained from the former to instantiate the latter. This requires the learner to go through several steps including (a) identifying the elements relevant to the word *fushinsetsu* from the context in example 3, (b) generalizing it in a way that is applicable to example 1, and finally (c) using the generalized knowledge to instantiate example 1. In this case, instantiation (i.e. the third step) is similar to that described by Anderson et al. (1976, 1978) in the sense that the learner instantiates by drawing on conceptual knowledge, although the learner's conceptual representation at this stage may differ from an L1 speaker's in terms of range of coverage, richness, and accuracy.

The incorporation of intra-lexical aid into the proposed model not only emphasizes the importance of having large amount of context-embedded input, it also allows the incremental effect of learning from context to be accounted for. Learners may not be able to achieve full instantiation by a single context, therefore further exposure to different contexts is needed to complement one another.

3.4 Conclusion and implication

Building on a usage-based paradigm, the present chapter has proposed a framework that accounts for what underlies conceptual competence that is crucial for the accuracy of language use (particularly in production), as well as the mechanisms by which such knowledge is acquired. The theoretical framework proposed is especially significant because 'accuracy' is one of the greatest goals for both L2 learners and teachers. However, many pedagogical practices remain to rely heavily on intuition or personal experience, due to the fact that studies on the related issues have yet to turn to inspect the cognitive aspects (rather than learning strategies) that contribute to the mastery of L2. Such tendency is believed to stem from the prevalent belief that 'an L2 is not acquired from scratch, but merely needs to be "reconstructed" drawing on already established concepts in the L1'. This is exactly why there is a vast amount of literature on the cognitive processes of L1 acquisition, yet completely the contrary in the case of L2 acquisition. The irony is that most scholars are indeed aware that there are hardly any words in two languages that overlap perfectly, or worse, some words apparently lack an equivalent in another language. All of these issues bring us to none other than a single conclusion: there *is* a set of mechanisms responsible for L2 acquisition which deserves a systematic theoretical account in its own right, and such model will need to take into deliberate consideration aspects that coincide with and differ from L1 acquisition. The illusion that L2 acquisition merely derives from L1 simply needs to be abandoned.

The present account draws on the notion of instantiation and gap-filling as its supporting ground. By clarifying and redefining the dynamic relationship among various components, the cognitive model helps to illuminate some important SLA issues, particularly concerning the use of context and L1 translation. To conclude, let me begin by reviewing the role of context towards acquiring target-like lexical competence.

Context provides an essential basis for instantiation. Context plays a vital role in acquisition, in the sense that the amount of contextual information is crucial to the quality of instantiation performed, which in turn determines the accuracy of gap-filling. Learning gains may, however, be affected by a number of other factors,

including externally provided meaning as well as internal aids. The proposed model provides a framework for future work to examine not only the effect of context and the properties of definition, but also the impact of prior knowledge especially intra-lexical and inter-lexical knowledge on learning. This may in turn shed light on the research of order of acquisition by predicting the learnability of a particular lexical item or usage. At the same time, the model offers a solution to the dispute concerning whether it is effective to learn in context by arguing that as far as accuracy (of conceptual knowledge) is concerned, learning in context is a *must*.

The need of instantiation emerges along the course of gap-filling. In the initial stages, the knowledge gap is huge as learners do not have many words in their lexicon. The gap is gradually filled with initially learned words, typically those of high frequency of use (see Nation, 2001). Rote learning of definitions or L1 equivalents may serve as an efficient approach at this stage, because the core issue is to retain as many words as possible within a short period to fulfill basic comprehension and production demands. However, as the learner's lexicon becomes saturated upon having acquired a range of frequently used words (including overuse in some of them), gaps become less easily perceivable and thus the less frequent words become harder to acquire. This shifts the cognitive demand of learning to making fine contrasts between words so as to allow knowledge gap to be filled (via the intake of the new word), at the same time readjusting the boundary of previously learned adjacent words. At this stage, instantiation becomes increasingly important with the increasing need to extract fine-grained meanings (i.e. elements) from context. If the learner continues to resort to rote learning, he is merely retaining the linkage between form and meaning of a word without engaging in gap-filling. The outcome of such approach is none other than vocabulary competence characterized by low accuracy due to the poorly structured conceptual representation. This is not to say that translations should be completely ruled out—dictionary definitions and other explicit forms of meaning continue to play a part in instantiation (although not exclusively) by providing a guide to help identifying the referential situation.

The model of instantiation carries several important implications for second language teaching and learning. In a foreign language environment in which the opportunity of interactive communication is scarce, input needs to be selected with

care in order to effectively foster instantiation. To begin with, materials should be of moderate readability in terms of the density of unfamiliar words, so that learners could make use of the surrounding linguistic context to assist instantiation of the new words. In terms of the content of the texts, the use of familiar topics (or contents that are likely to invoke mutual feelings or past experiences) is desirable as they are conducive to instantiation. At first glance such position may seem to contradict some studies that argue for the advantage of using unfamiliar topics (e.g. Parry, 1991); however, these studies, again, tend to equate form-meaning retention with vocabulary learning and overlook the need to build up conceptual knowledge. Learning from context can always be coupled with some mnemonic techniques such as the keyword method to yield maximum learning gains, in terms of both conceptual formation as well as form-concept retention. What is more important, learning from context does not imply that learners should focus solely on instantiation (i.e. attention to meaning); rather, they should also notice the forms used to express such meanings at the same time.

Rich contexts such as comics, animations, and dramas facilitate instantiation greatly by providing a vast amount of visual, auditory, psychological, perceptual, and kinesthetic information which is much less tangible when presented in the form of verbal description. In a study conducted by Neuman and Koskinen (1992), the effect of four different settings—captioned television, television alone, simultaneous listening and reading, and reading alone—on the learning of new word was compared, and the captioned television condition was found to be superior to the other conditions. This finding is consonant with the framework proposed in the present study. The superior learning effect of a captioned television can be ascribed to the richness of contextual information combined with the provision of meaning (i.e. the subtitle), resulting in an enhanced instantiation.

In classroom activities, teachers should guide learners in a way that encourages them to instantiate. For instance, newly learned words can be tested by requesting learners to either give or select an example that illustrates the appropriate situation of use. This method induces learners to process and retain the scenario in which the new word was encountered, rather than promoting the learning habits of memorizing an L1 translation or definition. Activities based on the notion of instantiation offer

an alternative to the translation method still widely practiced in places such as Japan in which the *yakudoku* ('read and translate') method remains as the dominant approach.

Apart from various input-driven tasks, output-driven activities are equally effective in helping learners to acquire a rich conceptual knowledge, based on a similar rationale. In either case, the tasks involve the matching of a target word to a specific referential situation, and such process can be fostered by the same set of factors described in Section 3.3.2. However, while in an input the learner first encounters the target word and subsequently performs instantiation, it is the exact opposite in the case of producing an output—the intended situation (i.e. the preverbal message) precedes the selection of the target word (see Levelt, 1993). In other words, the former requires the learner to identify the referent, while the latter the appropriate word. What is crucial in these activities is the involvement of communicative acts which entail active and ongoing exchange of meaning. An example of this is the task-based language teaching or learning that focuses on pragmatic meaning (see, e.g., Ellis, 2003).

Learners and teachers should also be aware of the various resources available to assist instantiation. With regard to the type of dictionary ideal for learning, it is argued that a definition that is most helpful in instantiation is indeed the most desirable one. This is to say that, the so-called best dictionary may vary from time to time depending on factors such as how far the learner is able to comprehend a definition in the L2, and what kind of (or how much) information he needs. Simply put, if an L1 equivalent or an L2 synonym is sufficient to aid instantiate adequately, a detailed and exhaustive definition could be more detrimental than helpful, and vice versa. Therefore, it makes little sense to eliminate the use of bilingual dictionaries simply due to the concern that learners might be inclined to learn vocabulary through one-to-one equivalents. Such consequence can be avoided by educating learners about the potentials and limits of L1 equivalents, and by promoting instantiation using the above-described procedures.

Other valuable resources include intra-lexical aid derived from multiple contexts. Learners should be encouraged to compare different contexts to build a rich conceptual representation by extracting commonalities from these contexts. CALL

classroom, for instance, allows learners to search on the internet for usages that are embedded in meaningful, communicative contexts, in contrast to brief dictionary examples. A carefully selected corpus may serve similar function. Intra-lexical aid also includes the use of morphological information, for instance drawing on prior knowledge on 'in' for a better grasp of the word 'instill', or the suffix -*komu* for the word *oikomu*. On the other hand, in order to make use of inter-lexical aids, the teachability or learnability of the target words needs to be taken into consideration. Less frequent words and expressions generally contain more refined meaning (which is what makes the applicable scope smaller) and therefore should be learned after acquiring the more frequent words.

The procedures discussed thus far are all about how to perform instantiation adequately. This is, however, by no means suggesting that the decontextualized word study method (e.g. paired word list approach) should be completely discarded; rather, it should be used with care as a complement to learning from context. This is not only because definitional knowledge plays a part in facilitating instantiation, but also due to the remarkable effect of such methods on form-meaning retention[13]. To put it in a nutshell, meanings (concepts) are best learned via context while the retention of forms may benefit from various decontextualized vocabulary learning strategies, thus learners and teachers shall make full use of both methods rather than seeing them as mutually exclusive.

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[13] With regard to the retention of form, the word list technique (by pairing the new L2 word with an L1 equivalent or an already learnt L2 synonym) is useful as it requires learners to attend to only one new information i.e. the new label at a time, compared to when learning in context where both the contextual information and the word form need to be processed and encoded simultaneously.

4. The formation of integrated knowledge

4.1 Generalization

In the previous chapter, how contextual knowledge forms the basis of the conceptual structure has been illustrated. Next, the present chapter will discuss the processes that lead to the establishment of an integrated conceptual representation, that is what Langacker (2000) termed as schema. A distinguishing feature incorporated in the following discussion is the roles played by L1 knowledge and the impact it has on acquisition as well as performance.

As described in Section 2.2, cognitive linguists maintain that the cognitive representation of integrated knowledge is formed by extracting commonalities across relevant exemplars (i.e. contextual knowledge) (Langacker, 2000; Mandler, 1992). In order to account for the different functions of L1, the present study proposes a two-step process consisting of: (1) the pre-generalization step that involves the identification of the perspectives that are perceived as relevant to the meaning of the word (i.e. relevant elements) from individual instances. This process will be termed as *selective encoding* (cf. Sternberg, 1987), and the selection of different perspectives will inevitably lead to the formation of different *routes*; and (2) the generalization of these elements in a way that could accommodate and apply to a range of referents.
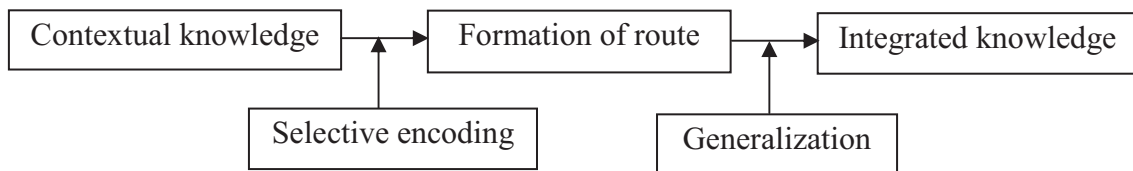
Figure 16. The processes involved in the formation of integrated knowledge from contextual knowledge.

L1 knowledge may exert different influence in respective stages. To begin with, the encoding of a usage event may differ across languages. Take, for instance, the situation 'my hair is falling out in clumps' which is encoded in Japanese using the word *nukeru* (*Kami no ke ga gossori nukeru*) by focusing on the perspective 'the hair, which was originally attached to the scalp, becomes detached', whereas in Chinese using the word *diao4* (*diao4 le xu3 duo1 tou2 fa4*) based on the perspective

'the hair, which was initially positioned on the head, falls off to the ground'. In contrast to L1 acquisition in which the emergence of an abstract schema takes place naturally as a consequence of recurring psychological events, L2 acquisition may not necessarily benefit from such abundance of input. Consequently, while L1 speakers may be assumed to be following a similar route in performing such pattern-finding, L2 learners do not always comply with the norm due to the poverty of input (see, e.g. Imai, 1993; Matsuda, 2000; Tanaka & Abe, 1984). In order to cope with the limited exposure and time coupled with stringent task demands, it is imperative for learners to be able to make generalization (thus enabling production) based on as few as one encounter with the word. It is thus posited that, apart from a target-like route (Figure 17i), L2 learners are also able to encode an L2 word in the form of an L1 route (Figure 17ii)[14]. Alternatively, learners may opt for a context-dependent, less clearly oriented route. This holds especially true when the learner fails to perceive commonalities between an existing representation (i.e. the standard) and the referent in question (i.e. the target), or simply because the learner has yet to encounter enough variety of exemplars to enable him to make comparison and perform a more efficient extraction.

i. "The hair becomes detached from the scalp"

ii. "The hair falls off from the body"
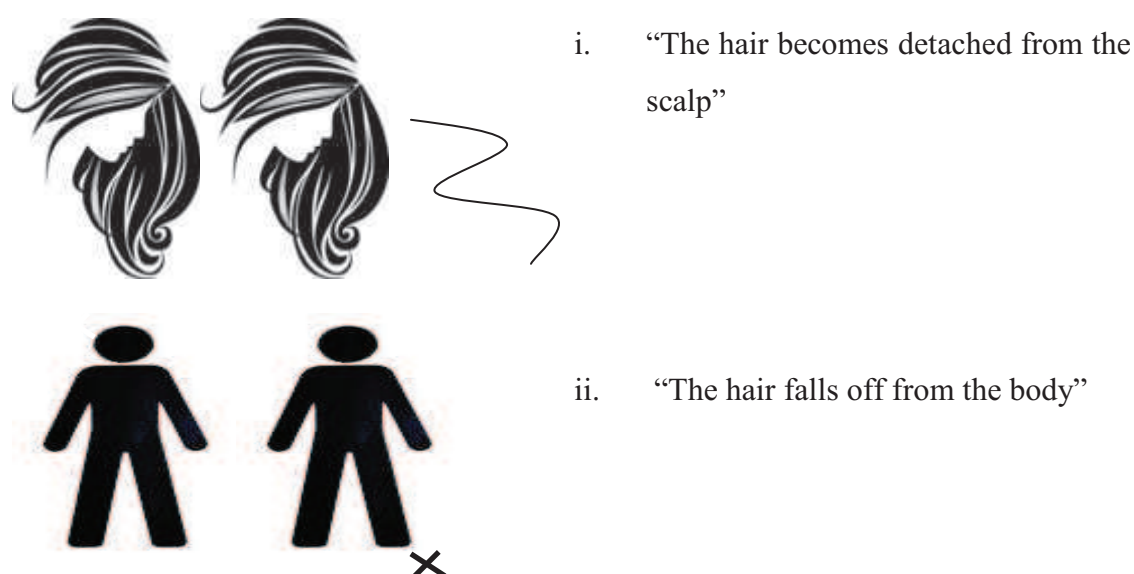
Figure 17. A target-like route and an L1-based route.

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[14] For ease of reference, this kind of transfer will be referred to as "transfer at the contextual level" or "transfer of contextual knowledge".

Instances (i.e. contextual knowledge) which are compatible to one another subsequently undergo generalization to form a category. The conceptual representation of an individual category is illustrated in Figure 18. It is important to note that without generalization, production of a word to express a novel situation cannot be possible because the situation is not identical as that in the input, except in cases where the word is used to refer to the very same referent.
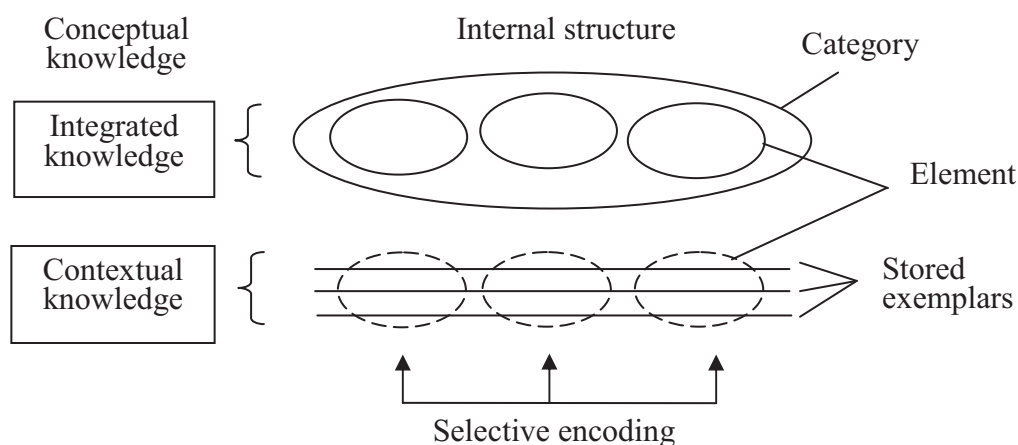
Figure 18. The internal structure of a conceptual representation.

Routes that follow the norm of the learner's L1 can be problematic when it comes to compatibility with other usages. Route (i) shown in Figure 17 is compatible with the higher category (i.e. the schema "something becomes detached or missing from another thing it used to be attached to") but route (ii) is not. This implies that route (i) has the potential to become integrated as part of the larger hierarchy while route (ii) will always remain isolated. The storage of too many exemplars as individual categories may be detrimental to the efficiency of the conceptual structure and give rise to not only memory burden but also difficulty in retrieval because the strength of form-meaning linkage developed in one category does not contribute to that in another.

Transfer of L1 knowledge may again take place during generalization, in which the integrated knowledge of L1 is transferred to the L2[15]. For instance, the concept

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[15] For ease of reference, this kind of transfer will be referred to as "transfer at the integrated level" or "transfer of integrated knowledge".

'open' embodied in the word *kai1* in Chinese can be applied to the acquisition of the Japanese word *akeru* owing to the highly similar structures, although these two words may not coincide perfectly in terms of the scope of permissible referents due to difference in selective encoding particularly in metaphorical usages (cf. Pavlenko, 2009). Transfer at this stage allows modifications to be made at the contextual level, either by eliminating inappropriate exemplars from, or adding novel instances to the transferred conceptual representation. This usually implies that the more prototypical usages (i.e. contextual knowledge) are more inclined to transfer than the less prototypical ones (Kellerman, 1979).

An important feature brought forth by the current view is that transfer of L1 is not limited to lexical level (i.e. whole concept), but is equally possible at element level. To illustrate this, consider the example of the Japanese words *nioi* ('smell') and *aji* ('taste') subsumed in the Chinese word *wei4 dao4*. The most efficient way for Chinese learners of Japanese to acquire these two Japanese words is probably by retaining them as '*wei4 dao4*, sensed through the nose' and '*wei4 dao4*, sensed through the tongue' respectively. In this case, learners do not need to fragment the element *wei4 dao4*, nor do they need to analyze the constituent of 'sensed through the tongue' (or what a tongue is), as these previously learned concepts constitute the smallest unit in the conceptual representation of the new lexical item. The notion of element makes it possible to account for more efficient utilization of previously learned concepts and thus provides a more plausible explanation concerning the transfer of L1.

In summary, by conceiving transfer as a process embedded along the cognitive processing of conceptual knowledge, the model possesses the capacity to account for the potential use of L1 knowledge, at the same time asserting the importance of learner autonomy in making cognitive decisions. Such microscopic view of conceptual formation allows a systematic organization of the conceptual store, in that adjustment or restructuring can be done flexibly at either the level of contextual knowledge or integrated knowledge. In the former, the learner is required to identify a new route in the exemplar in question (which is encoded differently in the learner's L1) so that it becomes congruent with other usages and thus can be integrated under the same category (i.e. integrated knowledge). Likewise, novel

usage, including metaphorical expressions peculiar to the L2 may also be assimilated into the conceptual structure following the same procedure. On the other hand, in cases where the existing integrated knowledge is inadequate to define the scope of referents accurately, fine-tuning can be done by modifying the existing elements or by adding new elements, whichever enables the most efficient organization.

4.2 The acquisition of target-like conceptual knowledge

Drawing on usage-based theories developed in the field of cognitive linguistics (Lakoff, 1987), Fukaya and Tanaka (Fukaya & Tanaka, 1996; Tanaka & Fukaya, 1998) postulate that conceptual representation needs to be characterized by at least three properties in order to function adequately and accurately in its permissible range of usage, namely *generalization*, *differentiation*, and *prototypicalization*. In this section, how accuracy of conceptual knowledge arises from the processing of contextual knowledge will be discussed.

The Japanese word "~*gimi*" ("slightly tending to something") will be used as an example to illustrate the process. This word was selected for reasons including: (1) it represents an abstract concept, (2) it has a rich set of usage, and (3) it has a number of synonyms.

Suppose that a learner encounters the word "~*gimi*" in the following situations and has performed instantiation adequately:

(1) "*Kaze-gimi*": "Some symptoms of a cold one gets after getting soaked in the rain the night before"

(2) "*Futori-gimi*": "One realizes that she is putting on weight when her clothes seem to have got tighter"

(3) "*Aseri-gimi*": "An unmarried woman approaching her 30s begins to feel anxiety about marriage seeing more and more of her friends walking down the aisle"

(4) "*(Ninki ga) sagari-gimi*": "The popularity of a singer seems to be on the wane as only 70% of his concert tickets were sold"

(5) "*Oshi-gimi*": "Team B is leading by 1 point as the volleyball tournament enters its endgame"

4.2.1 Generalization

As described in Section 4.1, generalization concerns the ability to apply a word across an array of situations. Generalization can be made at various degrees depending on the scope of applicability. For example, the learner may first establish three distinct categories by extracting commonalities among similar instances. The first category, 'undesirable symptoms that have begun to manifest themselves recently', can be formed from instances (1)-(3). The second category generalized from instance (4) may have a structure that sounds something like 'a situation that is starting to fluctuate', while the third category may go 'a tournament heading toward a desirable direction'. Owing to these categories, the learner is now able to use the word in situations such as '*tsukare-gimi*' ('be slightly tired') and '*bukka ga agari-gimi*' ('prices seem to be on the rise') by drawing on the first and second category respectively, but is yet to acquire the more extensive usage such as '*kouji ga okure-gimi*' ('the slight delay of a construction work') which belongs to none of the above categories. The problem of underuse (undergeneralization) is gradually overcome as the larger category 'the tendency of something to develop in an unfavorable direction starting from a particular point of time' is formed. Contrary to the more context-dependent categories, the more generalized category is prone to overgeneralization and could potentially give rise to erroneous production if the word is used in an inappropriate situation.

The key to accuracy lies in the quality and quantity of contextual knowledge (see Chapter 3 for detail) which determines the boundary of the categorizing structure. In other words, it is contextual representation that defines the conceptual content of a category—the more contextual knowledge is stored, the more accurately application can be made due to increasing competence. For instance, by understanding what it means by 'from a particular point of time', the learner would be able to eliminate usage that refers to an event that has yet to take place, such as '*ame ni nuretara kaze-gimi ni naru yo*' ('one will be inclined to catch cold if he gets wetted by the rain'). Likewise, knowing that 'the tendency to develop' implies a 'gradual process' would prevent misuse such as '*ninshin* ('get pregnant')-*gimi*'and '*ame ga furi* ('rain')-*gimi*'.

4.2.2 Differentiation

While generalization mainly concerns the expansion of range of use, differentiation operates in a rather opposite way by ensuring that the word is not overused beyond its permissible scope. Differentiation requires one to be able to distinguish between the target word and other lexical items (Fukaya & Tanaka, 1996). This can be interpreted as the competence to eliminate inappropriate usage from the scope of the target word. Take, for instance, the situation 'I tend to get tired easily ever since recovering from tuberculosis'. The occurrence of tiredness 'every now and then' (at multiple points of time) renders the situation incompatible with the conceptual element 'developing from a particular point of time', thus expressions such as '*tsukare-gachi*' or '*tsukare-yasui*' rather than '*tsukare-gimi*' would be favored. Conversely, if the element 'from a particular point of time' has yet to be acquired adequately, the learner might not be able to distinguish between '*~gimi*' and its adjacent words ('*~gachi*' and '*~yasui*'), and consequently misproduce '*tsukare-gimi*' in the above situation. As such, the element 'from a particular point of time' can be said to serve an active function in differentiating '*~gimi*' from '*~gachi*' and '*~yasui*'.

Differentiation does not necessarily imply that the same referent cannot be stored or represented in two or more categories (i.e. words)—the principle of differentiation applies to the conceptual representation in the form of *route* which incorporates learner's perspective, rather than in the form of unprocessed *instance*. For example, the word '*~gimi*' and '*sukoshi*' can often be used interchangeably (e.g. '*tsukare-gimi*' and '*sukoshi tsukareteiru*') because the situation in which '*~gimi*' is used often also fulfills the usage condition of '*sukoshi*', and vice versa. In order to differentiate effectively, one needs to identify the distinguishing feature (i.e. element) between the two words, that is whether a situation is perceived as 'a dynamic process' (expressed by '*~gimi*') or is viewed in terms of 'an amount or degree' (expressed by '*sukoshi*'). Such knowledge is crucial in selecting the most appropriate word for an intended meaning.

Differentiation develops over time as the learner accumulates more experience with the word in various contexts. The recurrence of a similar pattern across multiple exemplars facilitates the extraction of more conceptual elements thereby

resulting in a more refined and distinguished structure. Differentiation can also be facilitated by actively engaging in analytical processing. For instance, as the learner comes across word B in a context in which he thought word A should be used instead, contrasting the two words allows him to extract new element(s) that restricts the scope of word A or to revise the conceptual structure where necessary. It is also worth noting that since the boundaries between words are determined bi-directionally, the acquisition status of an adjacent word has a significant impact on the conceptual structure of the target word (see the Principle of Contrast (Clark, 1987)).

4.2.3 Prototypicalization

The third aspect of conceptual knowledge concerns knowing what a 'prototype' is, and the formation of which is coined here as 'prototypicalization'. In his studies with L1 speakers, Lakoff (1974) demonstrated that the boundaries between categories (i.e. words) are often fuzzy and that the prototypicality of a concept, e.g. *cup* declines in a gradual rather than abrupt fashion. Such knowledge is equally important in L2 acquisition because it can be crucial in making accurate judgment about whether a word is appropriate for a given situation. Knowledge of prototypicality can be discussed in terms of prototypical element and prototypical exemplar (Fukaya & Tanaka, 1996). The former refers to analytical knowledge of a particular concept, whereas the latter refers to non-analytical knowledge concerning the exemplar of a concept as a whole.

To illustrate a prototypical element, consider the element 'unfavorable' that defines one of the conceptual features of '~*gimi*'. It can be regarded as prototypical because '~*gimi*' appears to be used most frequently in undesirable situations (example 1-4). Knowing that '~*gimi*' mostly refers to a negative event allows the learner to produce '*yase-gimi*' when, say, 'someone looks thin and pale after an illness' rather than in a situation such as 'someone looks slim after succeeding in losing weight'.

Knowledge of prototypicality involves not just the presence or absence of an element but also the degree thereof. Owing to the concrete and specific nature of contextual knowledge, each element extracted from which can be considered as

carrying a specific 'value', and the storage of exemplars can be perceived as some sort of continuum across which the values of respective exemplars are distributed.
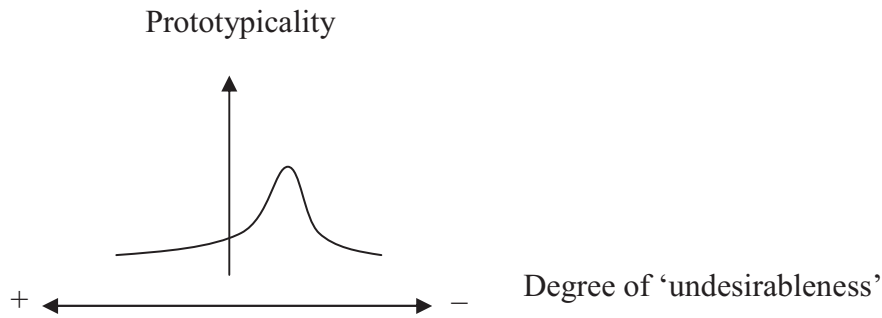
Prototypicality

Figure 19. Prototypicality of the element 'unfavorable' of the concept '~*gimi*'.

The instances of '~*gimi*', for example, tend to cluster in the area of 'slightly unfavorable' as depicted in Figure 19. The most prototypical value is the area which forms a peak, and prototypicality drops as the value moves further away from the peak. Consequently, in addition to positive events, the learner will also exhibit rejection toward neutral events, such as '**hore-gimi*' (to express 'fall in love with something'), as well as extremely disastrous events, such as '**igan-gimi*' (to express 'a precancerous condition' or 'suspecting early symptom of cancer').

Prototypicalization functions in parallel with generalization in restricting the scope of application of a word thereby securing accuracy of use. Meantime, it works closely with differentiation in determining the appropriateness of a word in a particular usage situation. Example 5 shown in Section 4.2, for instance, cannot be expressed using similar expressions such as '*sukoshi*', '~*gachi*', thus '~*gimi*' fits in well despite having to compromise part of its conceptual elements (the element of 'unfavorable'). In contrast, in cases such as '*kaze ga sukoshi yoku natta*' ('my cold has got slightly better') or '*seiseki ga sukoshi yoku natta*' ('results seem to have improved a bit') where other candidates (i.e. words) are available, the word '~*gimi*' becomes less applicable due to the absence of the prototypical element 'unfavorable'.

Prototypical exemplar, on the other hand, concerns knowledge of the most representative instance of a concept. The formation of such knowledge is highly dependent on the frequency of use (Matsuta, 2000). Theoretically, the more prototypical a usage is, the more easily it is identified. For instance, if '*futori-gimi*'

is encountered more frequently than '*kaze-gimi*', the former is likely to be retrieved more easily than the latter, and vice versa.

4.3 Multilevel conceptual structure and internalization of concept

The discussion thus far has illuminated how contextual knowledge and integrated knowledge are connected in the conceptual structure, as well as how they are formed and how they may affect the formation of one another. As discussed in Section 4.1, contextual knowledge is comprised of individual concrete referents, while integrated knowledge is an abstract structure formed from these instances. Suppose that contextual knowledge is positioned at the base of the hierarchy (with level 0 of abstractness) due to its concrete and specific nature, whereas integrated knowledge is positioned at a certain level of abstractness with a relative (vertical) "distance" from contextual knowledge. A conceptual structure that incorporates these features including those described in Section 4.1 is illustrated in Figure 20.
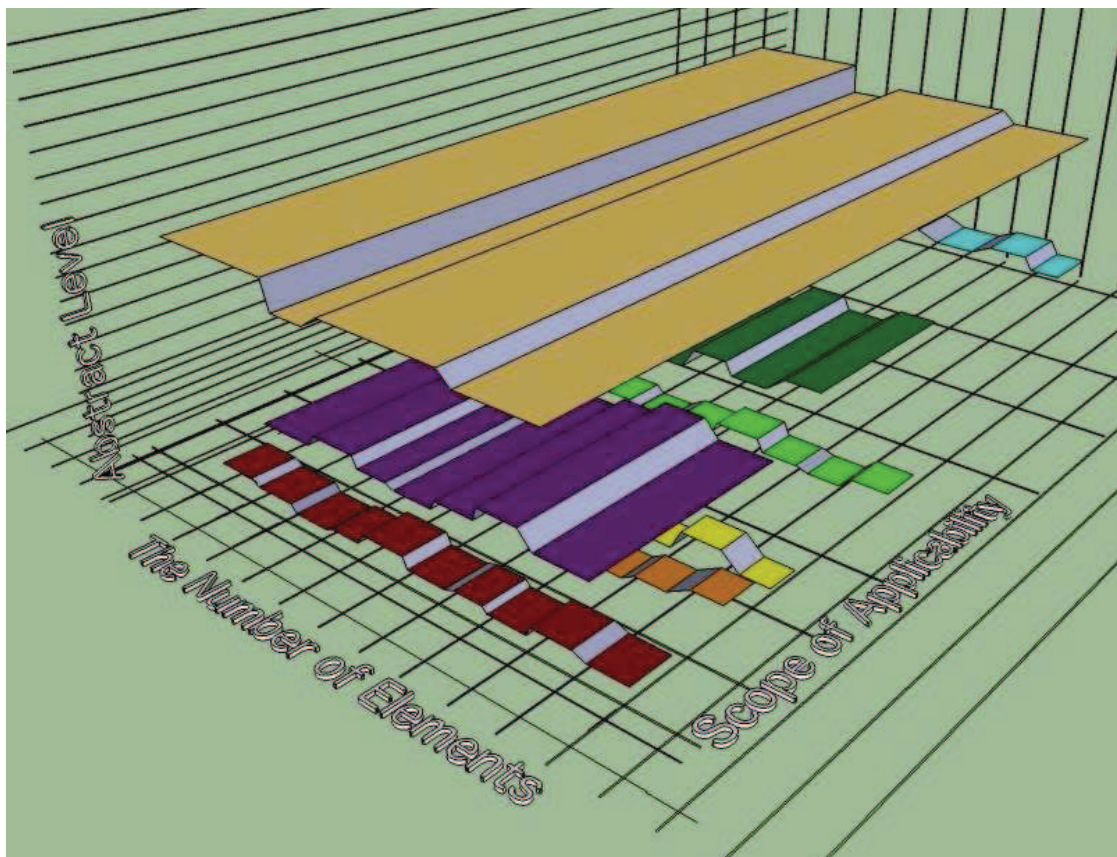
Figure 20. Conceptual structure of a single unit (i.e. word, phrase) illustrated in three dimensions (contextual representation is not shown; also, the connection between layers is not expressed in the graph).

The (horizontal) distance between categories on the axis of "scope of applicability" is determined by relative perceived similarity. This accords with the argument made by Langacker (2000, p. 13), in which distance between two structures depends on how far they elaborate one another. The notion of level of abstractness is postulated as the underlying construct that determines automaticity, i.e. the speed of retrieval during lexical access in production. The more abstract (less automatized) a category is, the more effort and time will be needed to decide whether it is applicable to an intended situation.

The abstract level (of integrated knowledge) is dynamic and fluctuates along a developmental process termed as *internalization* in the present study. Internalization is defined as a function of the strength of contextual knowledge, since contextual knowledge constitutes the specific lexical content of integrated knowledge. The rationale of this is as follows. The repeated occurrence of lower level instances tends to reinforce their commonalities and thus facilitates the emergence of the higher level category (which encompasses these instances) as an established cognitive entity (Langacker, 2000). In a state in which contextual knowledge is adequately reinforced, the category—including all its constituent elements—are embedded or firmly grounded in the supporting instances. This can be expressed in terms of level of abstractness: the more specific instances are stored, the lower the level of abstractness of the categorizing structure becomes. Conversely, conceptual representation that has a weak contextual support is abstract in nature, and thus its constituting elements may also tend to vary in level of abstractness due to lack of integrity. For ease of reference, the two conditions above will be termed as context knowledge-dominant state (indicating the strength of contextual representation) and integrated knowledge-dominant state respectively. It is worth noting that in either case learners might have developed adequate competence, but performance may vary especially under time constraint due to the difference in internalization.

Automaticity has a significant impact on the building of competence. By default, more broadly generalized categories are in principle more abstract than the less generalized ones. This explains why learners are inclined to form context-dependent categories especially when they have not encountered sufficient instances, not only for accuracy concerns but also due to ease of retrieval. As shown in Figure 20, the

level of abstractness differs not only among categories but also among elements within a particular category. During acquisition, learners need to keep refining the conceptual representation by making more fine-grained distinctions between semantically-related items (Sonaiya, 1991). It is hypothesized that the more salient elements—including those transferred from the learner's L1—undergo automatization faster due to reasons that may include earlier acquisition and thus stronger reinforcement, and the relative "weight" they carry according to learner perception[16].

The two kinds of L1 transfer discussed in Section 4.1 have an important implication here. A separate category adopting the L1 route (i.e. transfer that takes place at the 'selective encoding' stage) is characterized by lower level of abstractness due to not just its context-dependent nature, but also the internalized L1 route. On the other hand, in the case of transfer of integrated knowledge (i.e. transfer that takes place at the 'generalization' stage), the abstract level depends on the proportion of contextual knowledge transferred. Since the abstract level of a categorizing structure lies in the number of specific exemplars that have been stored, a higher rate of transfer implies a higher degree of internalization. In this way, internalization provides an explanation for why the use of L1 knowledge is favorable, even though the ease of access (immediate automaticity due to transfer of knowledge from the L1) may sometimes be at the expense of accuracy and economy of the conceptual structure.

The degree of internalization affects the speed of lexical access during production, by determining how readily selective encoding and generalization can be performed[17]. During conceptual access, multiple routes—including erroneous ones—that are applicable to the referential situation (i.e. preverbal message) in

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[16] According to the view of the present study, saliency is one of the major factors that govern gap-filling. A more salient gap is more readily filled because the learner sees a need for intake of new knowledge, consequently resulting in a more stable representation.

[17] It operates in a reverse order during comprehension; however, the present paper places its focus on production and shall not discuss this matter in detail.

question compete for retrieval. The more internalized routes are likely to be retrieved faster than the less internalized ones. Likewise, in an integrated knowledge-dominant state, the more internalized elements will be accessed faster than those which are less internalized, resulting in a higher probability of performance mistake during real-time production. For instance, an English- or Chinese-speaking learner of Japanese may encode the words *kiru* and *haku* as "put on a garment by slipping one's arms through" and "put on a garment by slipping one's legs through" respectively. While the element "put on a garment" (equivalent to *chuan1* in Chinese) is readily available in the learner's L1 and thus is transferrable to the target L2 words, the distinction concerning how the garment is put on does not exist in the learner's L1. As a consequence, when the learner encounters a situation that requires him to produce the word *haku*, he is likely to encounter more difficulty in identifying the element "by slipping one's legs through" compared to "put on a garment". When production is performed under time pressure, the discrepancy in automaticity between elements may lead to performance mistake, such as mistakenly producing *kiru* for *haku* in this case.

4.3.1 Modeling the process of internalization (the development of automaticity)

As described in Section 4.1, conceptual structures are formed from contextual representation comprising of multiple specific instances. Owing to its concrete and specific nature, such contextual knowledge contributes to not only the development of competence (accuracy) but also the accessibility (automaticity). In what follows, the trajectory of the development of automaticity as a function of internalization will be described.

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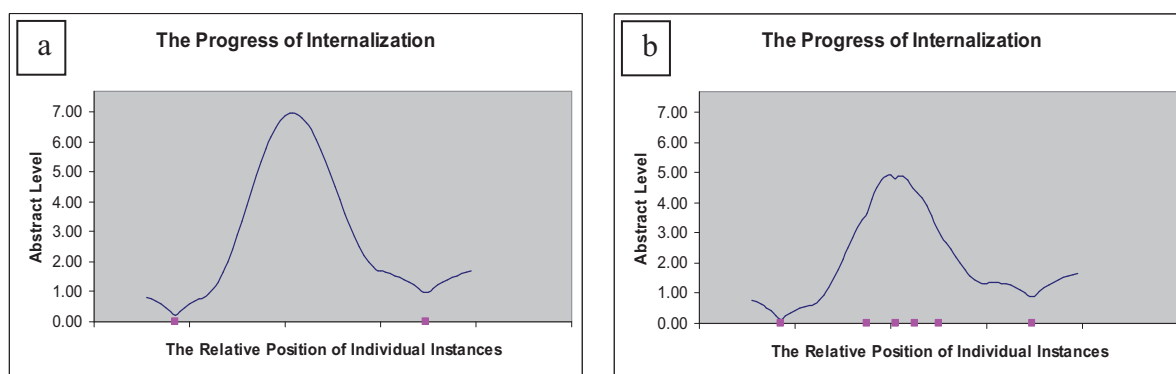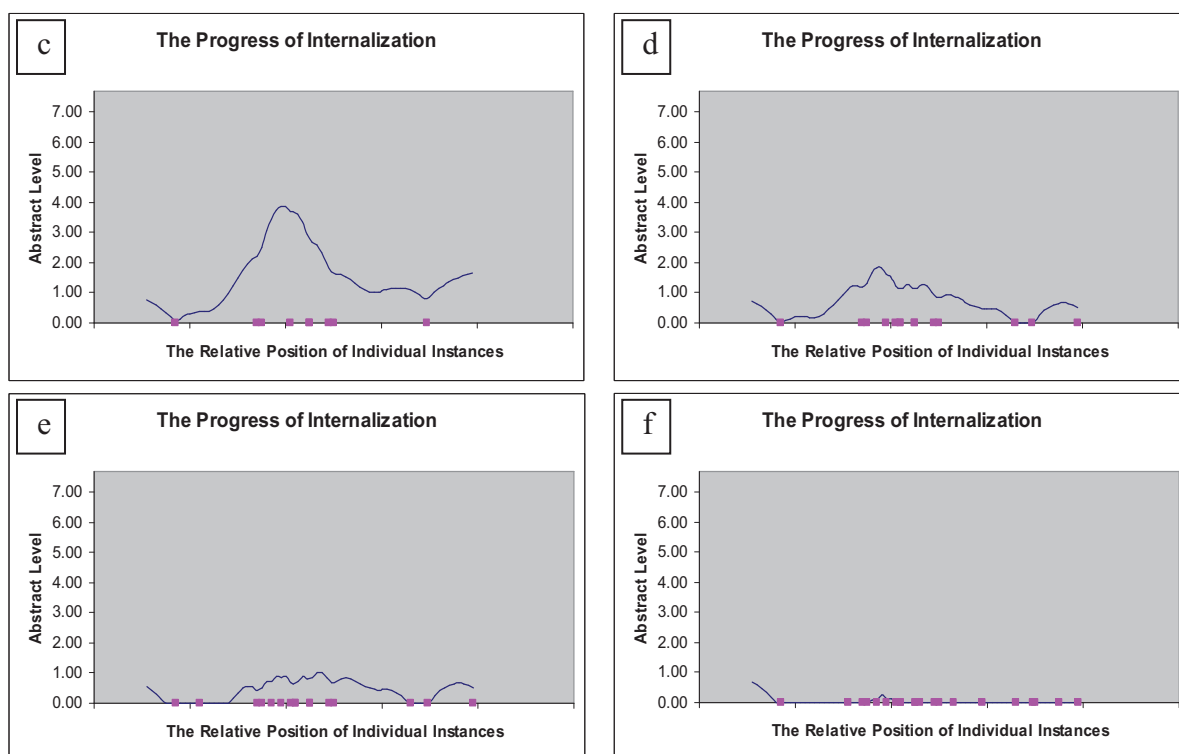
Figure 21. Modeling of the stages of internalization.

The initial stage (Figure 21a) shows a state in which two context-dependent categories and an abstract higher category are formed based on two encounters of rather distinct usages. Assuming that these categories are compatible, they can be represented in the form of a connected line which shows different abstract levels across the structure. By virtue of such category, the learner is now able to produce the word in a variety of situations. However, acquisition (competence) of the lexical item might not be complete yet as production may be prone to overuse and underuse in certain usages. In particular, aspects of knowledge such as frequency, prototypicality, register, connotation, and other subtle nuances are most likely to elude the learner as these properties only emerge when one has acquired a substantial inventory of instances. As a result, what learners view as prototype might be largely presumed based on the knowledge they have (including the instances encoded, L1 knowledge, etc.) and often diverges from what native speakers regard as prototype (see, e.g., Imai, 1993; Matsuda, 2000). Also, in terms of automaticity, lexical retrieval may be effortful and time-consuming especially for usages that fall in the high abstract level zone, potentially leading to performance mistakes.

With every incoming instance[18], there will be a drop in abstract level[19] across the entire structure, as shown in (Figure 21b-c), marking a shift toward context knowledge-dominant state from integrated knowledge-dominant state. The rationale behind is that instances demonstrate the use of a word in a concrete sense, thus with stronger contextual knowledge there is less need to make drastic inference. The decline in abstractness, in turn, accounts for how automaticity develops. As contextual knowledge continues to develop—via both incoming input as well as testified output—the conceptual structure becomes more refined giving rise to more target-like competence. In parallel to that, access fluency gains enhancement as internalization progresses.

At a point of time, the learner arrives at a state in which his conceptual knowledge enables him to operate in both comprehension and production in a considerable range with some extent of ease (fluency) (Figure 21c-d). The pattern of progress and the final outcome of acquisition may diverge here depending on whether the learner continues to make an effort to refine his conceptual structure. On one hand, the learner might be inclined to focus on the meaning of the discourse and be discouraged to notice the form used due to adequate comprehension of the input (i.e. lack of communication gap) and thus ceases to develop new contextual knowledge[20]. As a consequence, the failure to make further advancement may

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[18] To encode an instance means to engage in an input processing (in the case of input) or hypothesis testing (in the case of output) that will leave a memory trace.

[19] The graph shown is plotted according to the crude measurement following the hypothesis that the degree of drop decreases with increasing distance from the new instance. This is justified by the rationale that the new instance contributes most directly to its immediate "neighbor" (i.e. highly similar usage), and the relevance gradually diminishes for usages that are distant from it. However, so far as these usages remain connected by being bound to one same upper category, they would, theoretically, benefit from the decline in abstractness that occurs to any point on the continuum (i.e. axis x).

[20] The importance of noticing of form has been widely recognized in the field of SLA, and has been elaborated in detail in Long's (1988) study. It is important to

manifest itself either in the form of fossilization in cases where the learner has yet to attain adequate competence i.e. there are usages either not known to the learner (i.e. underuse) or used incorrectly (i.e. overuse), or in the form of performance mistake. It is suggested that this partly explains the difference between "learning" and "acquisition"[21]. In the former, learners typically have the full word form and its definition at their disposal (typically provided by graded textbooks or dictionaries), as well as sufficient time to process and encode the word form and its meaning. With the aid of such lexical knowledge they tend to experience less difficulty in comprehending an input, and may thus be inclined to use their attentional resources in areas other than the lexical item itself (such as processing the non-lexical information, etc.). In contrast to this, learners who acquire L2 from naturalistic input (including watching dramas, having genuine communication, etc.) are likely to pick up the form and meaning fraction by fraction upon each encounter. The knowledge gap prompts them to pay attention to the word form and its usage (as an attempt to

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note that focus on form is not limited solely to the explicit focus on language features; rather, learners must be aware of the meaning and use of the language features before the form is brought to their attention. In other words, noticing of form is indispensable for the intake of contextual knowledge, because form is the label to which conceptual knowledge is eventually tied to.

[21] The former refers to the conscious process of studying a language and the latter to the subconscious process of "picking up" a language through natural exposure (see, e.g., Krashen, 1981). The distinction between these two processes is closely related to another distinction concerning the surroundings in which they take place, i.e. between instructed and naturalistic setting. The first, according to R. Ellis (1994), refers to the case in which the language is learnt through "study, with the help of 'guidance' from reference books or classroom instruction", whereas the second through "communication that takes place in naturally occurring social situations". The present study is by no means attempting to testify to, or argue against, the validity of such distinction; rather, it only aims to provide a plausible explanation for the different trajectory and learning outcome due to different processes or settings.

acquire the meaning), thus facilitating the strengthening of contextual knowledge (for the effect of noticing on learning, see Schmidt, 1990; Robinson, 1995).

On the other hand, owing to the strengthened form-meaning linking upon repeated occurrence, learners are indeed at a better position to further develop contextual knowledge because more attentional resources are freed up to allow simultaneous processing of the meaning and form of an input. In other words, learners have an advantage in terms of *attention* but not *noticing* at this stage. Therefore awareness plays an important part here—learners need to be aware of their knowledge gap, either in terms of accuracy (that the learner is able to *comprehend* but not *use* the word correctly) or fluency of production (that the learner is able to use the word but not in an automatized manner). By constantly engaging in the active intake of contextual knowledge from context-embedded input, an internalized conceptual structure that is similar to that of a native speaker can be gradually formed (Figure 21e-f). This ideal state of knowledge comprises the three components that underlie target-like performance, namely accuracy, fluency, and scope of application. It is only at this stage that full competence including aspects of connotation, register, frequency, prototype, subtle pragmatic or affective difference, etc. is acquired.

It is worth noting that in sharp contrast to models of L1 acquisition, the present model stresses the robustness of adult L2 learners' cognitive devices. By virtue of their analytical ability as well as a large repertoire of previously learned concepts, adult learners are capable of creating abstract representations in just a few encounters with a word. However, such efficiency may sometimes be achieved at the expense of accuracy. In this sense cognitive maturity can be said to be double-edged, potentially leading to either incomplete acquisition of competence (i.e. fossilization), or the persistence of performance mistake over a prolonged period of time (due to incomplete internalization)[22]. In summary, the proposed model is

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[22] Due to difference in cognitive maturity and consequently difference in the pattern of acquisition and conceptual representation, this kind of performance mistake (of relative stability) is arguably unlikely to occur in young children. If this proves to be

congruent with the acquisition view of usage-based theories, and in addition to that it possesses the capacity to account for the performance exhibited exclusively by adult L2 learners. More importantly, it incorporates both the development of competence and automaticity within the same model by positing contextual knowledge as the underlying factor.

4.3.2 Chunking

The discussion thus far concerns the conceptual representation of individual lexical units. The composition of these units to form longer stretches of phrases (i.e. chunks) also plays a crucial role in facilitating fluent retrieval. Nevertheless, theories of rule application and chunking have conventionally been treated as rather distinct approaches to the development of automaticity. No theory in the literature to date has attempted to reconcile these two processes within a single framework, probably due to the seemingly distinct mechanisms at first glance. The present study argues, however, that the two processes share many similarities and may work in concert towards achieving automatized processing.

In the present framework, chunks are viewed as units of established categories which are relatively low in abstractness due to the context-dependent nature. Owing to such characteristic, chunks have a smaller scope of application compared to single lexical items. In terms of these conceptual properties, chunks are largely similar to other non-chunk context-dependent categories described in the previous section, but differ from these categories in terms of the encoding of form. Chunks could be either analyzed or unanalyzed, depending on whether the constituents are encoded in respective corresponding conceptual structures. Until being analyzed, chunks remain isolated and disconnected from the structures of the constituent lexical items. As a consequence, the retention of form-meaning linkage may be more effortful since no aid is available. Memory burden is further imposed by the lengthy syllabus of chunks (because even though respective constituents may have already been learned, the combination per se is new, and more so if the chunk contains unknown

true, the fact lends strong support to the model of internalization (i.e. development of automaticity) proposed in the present study.

constituent), as well as the larger amount of contextual information that needs to be retained, compared to the case of single lexical item (see Table 1). Therefore chunks are generally formed as a product of recurring encounter (cf. N. Ellis, 2001).

Table 1: Form- and meaning-information that needs to be attended to during encoding as a single lexical item and as a chunk.

Unit	Form	Conceptual representation
Single lexical item	Lexical unit	Must contain contextual information pertinent to the word
Chunk	Chunk unit	Must contain contextual information of the entire chunk

In view of these reasons, the present study postulates that in general, L2 learners are unlikely to form chunks before first acquiring the constituents, unless the chunks are met in a frequency high enough to leave a trace in memory, or unless they are not analyzable for the learners yet, or linked in an idiosyncratic manner (e.g. proverbs). This is to say that, chunking may only account for the fluency of a small amount of words during the early stages of acquisition, but may manifest increasing effect in the later stages. As repeatedly emphasized over the previous chapters, it is often imperative for adult L2 learners to process input in the most economical and efficient way in terms of both attention and storage (memory). This implies that, first, new information (i.e. unknown words or usage) is prioritized over old ones, especially when attentional resources are insufficient; and second, the new information would be, as far as possible, associated with an already established conceptual structure resulting in an integrated hierarchy (as opposed to being encoded as independent structures). These requirements can be fulfilled by L2 learners' ability to attend selectively (see, e.g., Schmidt, 1990) and to think about abstract concepts (see, e.g., Piaget & Inhelder, 1969).

Learning efficiency owing to such cognitive maturity is not without cost. The consequence of this is suffered more seriously in the learning of some words than the others. Take for example, the widely observed phenomenon of the difficulty in acquiring English phrasal verbs (Cagri, 2012; Kao, 2001; Moon, 1997) and Japanese compound verbs (*fukugoudoushi*) (Matsuta, 2002; Morita, 1978) experienced exclusively by L2 learners. These verbs are, more often than not, composed of

morphemes that are already known to the learners. Consequently, instead of learning these verbs as chunks, learners are more inclined to tackle them by analyzing the constituent structures. The utilization of previously established conceptual structures (of the constituents) allows the form-meaning linkage of the verbs to be more easily retained. There is, however, one caveat: the ease of encoding does not necessarily imply the ease of retrieval. The encoding of these verbs by their constituents makes access difficult for two reasons. First, it takes two counts to retrieve a phrasal verb (since the components are stored separately), as opposed to a single unit when retrieved in the form of chunk. Second, the conceptual representation (category) is relatively more abstract than when encoded as a chunk (a relatively concrete category) (Figure 22a), unless the conceptual representation has come to a stage to be able to accommodate the new instance with ease[23] [24] (Figure 22b).

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[23] The contextual representation of the phrasal verb may fail to gain reinforcement if too much focus is placed on the higher (abstract) level structures. Consequently, learners may gradually fail to recall the meaning (i.e. backsliding of competence) of the phrasal verb, because the abstract structure is not reducible to the specific contents contained in the contextual representation.

[24] Young children, on the contrary, are less capable of forming abstract representation (Piaget & Inhelder, 1969; Nelson, 1996; Tomasello, 2003) and at the same time, exposed to abundant comprehensible input. These conditions predispose young children to learn phrasal verbs as chunks first and only analyze the constituents later. Children learning the L2 in naturalistic settings also exhibit similar tendency, as demonstrated by Wray (2002) in her review of research concerning formulas in L2 learning. Therefore, not only do L1 speakers not undergo the kind of difficulty as do L2 learners, phrasal verbs are generally recognized as the easier expressions compared to their single word synonyms, such as *take over from* in comparison to the word *substitute* (source: private interview with English native speakers).
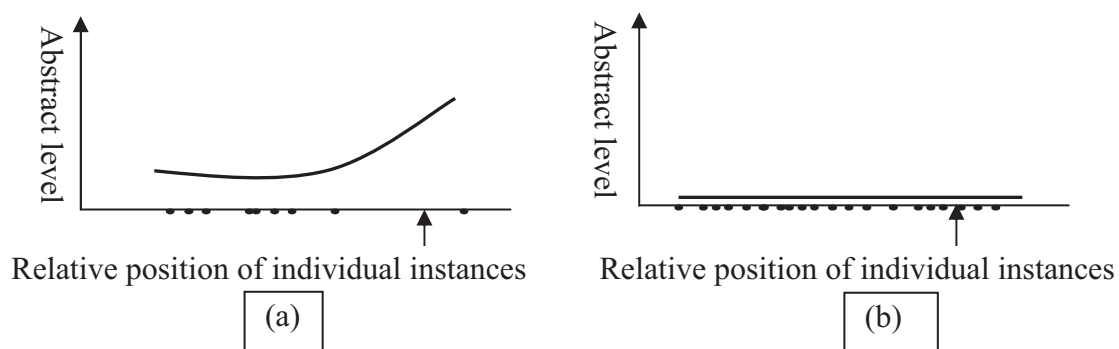
Figure 22. The ease of retrieval of the word "take" (indicated by arrow) as part of a phrasal verb (e.g. "take over") compared between: (a) a highly abstract category which is formed by categorizing the phrasal verb usage as an extension from the more conventional usage; and (b) a highly internalized category, in which numerous conventional and metaphorical usages of the word have already been established.

It is argued that chunking begins to take place steadily as L2 learners gain more exposure to recurring strings of input and when attention is freed up due to the decreasing number of unknown words and usages. Chunking contributes to the fluency of access by "guiding" lexical retrieval[25]. Not only is access made easier due to the lower abstractness of the category, the prefabricated string of a chunk also helps to reduce the number of possible candidates that may come after a certain word thus speeding up lexical search. For instance, a learner may take longer time to figure out whether *genmitsu-na* or *genjuu-na* (both mean "strict, rigid") is the appropriate modifying adjective for the noun *imi* ("meaning"), but by establishing a category for the chunk *genmitsu-na imi* ("in the strict sense"), lexical retrieval can be performed more efficiently without having to screen through the fine distinctions between the two candidates. It is important to note that access of words via chunks is by no means saying that the processing of form alone will suffice. Although *imi* is never used with *genjuuu-na* but it can collocate well with a number of other adjectives. Thus the conceptual dimension does need to be processed, but less rigorously with the help of chunk.

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[25] Chunking may also contribute to the fluency of processing on other levels such as articulation, with the justification that muscle movement is arguably smoother for a constantly recurring string than for an unfamiliar combination of words.

In order to be readily accessible, both form and meaning of the chunk have to be internalized. If the form linkage among the constituents is weak, the category of the chunk will not be accessible and the learner will need to resort to single lexical item access instead. On the other hand, if the processing of form precedes the processing of meaning, the learner may mistakenly produce a chunk that does not match the intended meaning. For example, if a learner is accustomed to the form "listen to the music" but fails to internalize the concept that corresponds to it, he may be inclined to tongue slips such as "Do you *listen to* the music out there? Are they having a party or something?" (Source: Tanaka & Abe, 1984)

The view taken by the present study allows chunking effect to be accounted for without contradicting single lexical item access (non-chunking) discussed in the previous section. This places rule production and chunking in a complementary rather than an either-or competing relationship. The theoretical underpinning is fundamentally the same, except that the process of lexical retrieval can be speeded up when the category of chunk is available for access.

In summary, access fluency brought about by chunking generally takes place only after the constituents are acquired and internalized. Formation of chunks at early stages of acquisition can also be possible for learners who are exposed to large amount of context-embedded input. However, it is argued that chunking cannot account for efficient learning that is necessary for learners who are given limited time to acquire the language. As learners come to a point where chunks can be readily formed, the acquisition pattern may converge with the prediction made by connectionist models. In this way, the proposed model exhibits compatibility with frameworks established in the domain of L1 acquisition, meanwhile arguing for the different stages these processes may come in place. As an extension of chunking, a number of structural regularities and rich lexical information can be derived from the analysis of word distributional properties of the instances stored, as suggested by Kiss's (1973) study of the acquisition of grammatical word class using computational model. These properties together give rise to a highly complex knowledge network that is being rigorously studied under the heading of connectionist approach.

4.3.3 Summary

In what follows, how the present theory relates to those in the literature will be briefly described. First, the proposed model appears to conform to the power law of practice, which is often considered the most important test of any theory of cognitive skill acquisition. The power law of practice states that initial practice leads to the speedup of performance. The effect of practice on reaction time starts to diminish after a certain stage, and finally reaches a limit and does not improve reaction time any further. The present model predicts this curve of learning by the progress of internalization (Figure 21) coupled with chunking effect. With regard to chunking, the frequency of use decreases with the length of chunk, thus the formation of longer chunks will eventually have no significant influence on performance.

The item-based approach, as pointed out in Section 2.3.2, is strictly confined to identical stimuli. While this may hold true for the acquisition of aspects of language such as inflection rule, it has limited validity and applicability in the case of acquisition of concept because in practice, one referential situation inevitably differs from another, however similar they may seem. However minor the difference may be, it should be treated as a matter of degree rather than seeing the stimuli as identical entities. Therefore, the retrieval of the lexical item necessitates the recourse to a categorizing structure (i.e. the "rule", in psychological terms).

Rule-based approach, on the other hand, argues that rules (i.e. the "declarative knowledge" in J. R. Anderson's terms) are gradually converted into executed productions (i.e. the "procedural knowledge") thus speeding up performance. When full automatization is achieved, the initial rules either decay from memory or become no longer retrievable. Such view is especially problematic when applied to the acquisition of conceptual knowledge, first in that it contradicts usage-based theories which hold that linguistic representations (can be seen as equivalent to "rules", for ease of comparison) emerge—rather than decay—from the recurrence of instances of use. Such linguistic structures are crucial for the production and comprehension of language. Second, similar to the above argument, while the accurate use of inflection forms can be made possible by the memorization of a set of explicit rules, the same does not apply to the use of conceptual knowledge. As elaborated in Section 2.2, 3.3.1, and 4.1, specific instances are the basis on which

the linguistic system is formed, and the presence of which is inevitable for accurate use. As such, the rules (i.e. linguistic system) and instances are viewed as two complementary (rather than mutually exclusive) components that together form the conceptual representation. The number of instances encoded leads to a decline in abstractness of the categorizing structure, thereby contributing to increased automaticity of lexical access.

With regard to the process of restructuring that takes place during acquisition, the present model provides a plausible explanation for the U-shaped behavior by suggesting the following. The first possibility is that the initial conceptual structure is overextended, that is, the elements are not well refined enough. Assuming that a learner has learned word A but has yet to learn the conceptually-related word B, he constantly uses word A in an overgeneralized sense not only for situations that go well with word A (resulting in constant accurate use) but also some that ought to be expressed using word B (resulting in constant erroneous use). When word B was introduced, the learner will need to learn this new word and redefine the structure of word A by making finer differentiation at the same time. Until the new elements are acquired and internalized, the learner is likely to exhibit performance mistakes in both directions, including in situations where the learner had seemed to master in the earlier stages [26]. The second possibility is the contrary to the first, that is, the initial conceptual structure is undergeneralized. This implies that the word can be used correctly, but only within limited contexts. Underuse arises from context-dependent category. When the learner gradually comes across more instances that allow him to make a broader generalization (suppose that the context-dependent category is not one that is compatible with the higher level category), the shift of access from the context-dependent (i.e. more internalized) category to the more abstract (i.e. less internalized) one causes a drop in fluency thereby leading to performance mistake.

Finally, the model is also compatible with chunking and strength theory (connectionist theories), but arguably at a later stage when the learner begins to form

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[26] A similar rationale has been provided by Lightbown (1983) in her studies of the U-shaped curve of acquisition.

stable conceptual network, that is when the so-called "overlearning" begins to take place.

4.4 Production model

According to the speech production model put forth by Levelt (1991), preverbal message that is to be verbalized is formulated via lemma retrieval and phonological encoding (i.e. meaning-form encoding) as shown in Figure 23. The present study focuses on lemma retrieval as well as its corresponding knowledge storage, i.e. lemma.
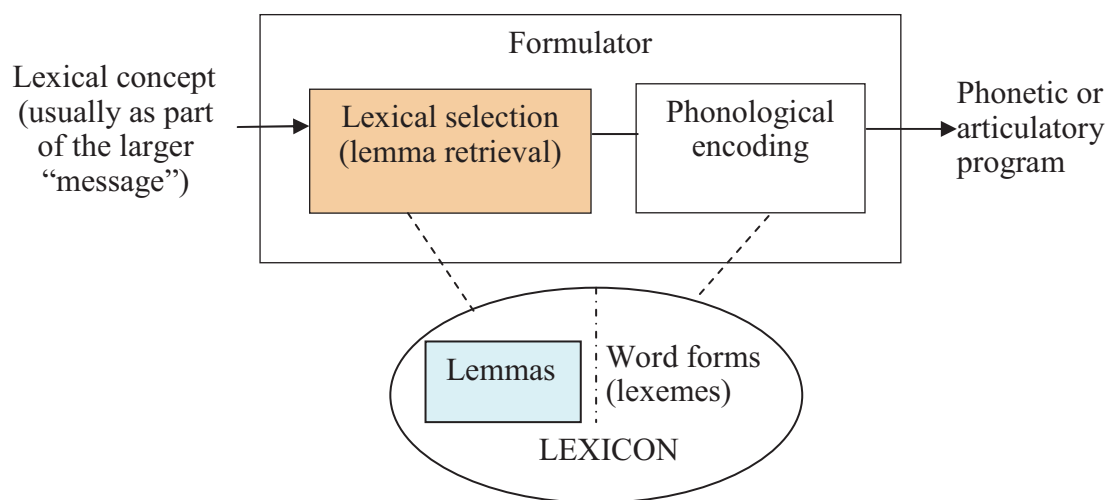
Figure 23. Lexical access in speech production (adapted from Levelt, 1991, p. 4)
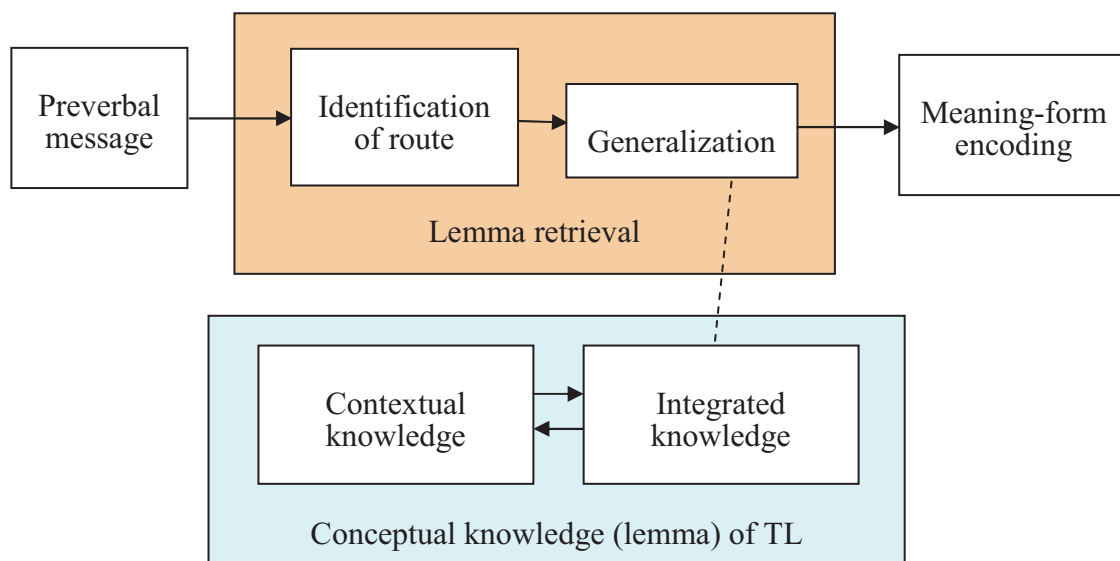
Figure 24: Speech production model incorporating the identification of route and generalization.

As previously discussed, the present paper posits a dual-layer conceptual knowledge comprising of contextual knowledge and integrated knowledge. During production, lemma retrieval is made through access to the integrated knowledge (as it is the construct that enables innovative use). To that end, the elements (i.e. route) that are to be encoded need to be identified followed by generalization, so as to be matched to the corresponding integrated knowledge, resulting in a procedure mirroring the two processes of acquisition (see Figure 16 and Figure 24). According to the theory developed here, the more internalized routes or elements undergo these steps more rapidly, while the less internalized ones may not be processed adequately in the case of limited processing time.

A different prediction about learners' performance could be made by the theory espoused by Kroll and Stewart (1994) and Pavlenko (2009) in which lexical access of the target language is made through a lexicon shared with L1. The whole process, assimilating mechanisms proposed in the present study, is depicted in Figure 25 with (i) and (ii) corresponding to *lexical mediation* and *conceptual mediation* respectively according to Kroll and Stewart's (1994) terms. These associations are re-interpreted here as a product of the frequent co-activation of an L1 word and its L2 counterpart, based on the notion of connectionism.
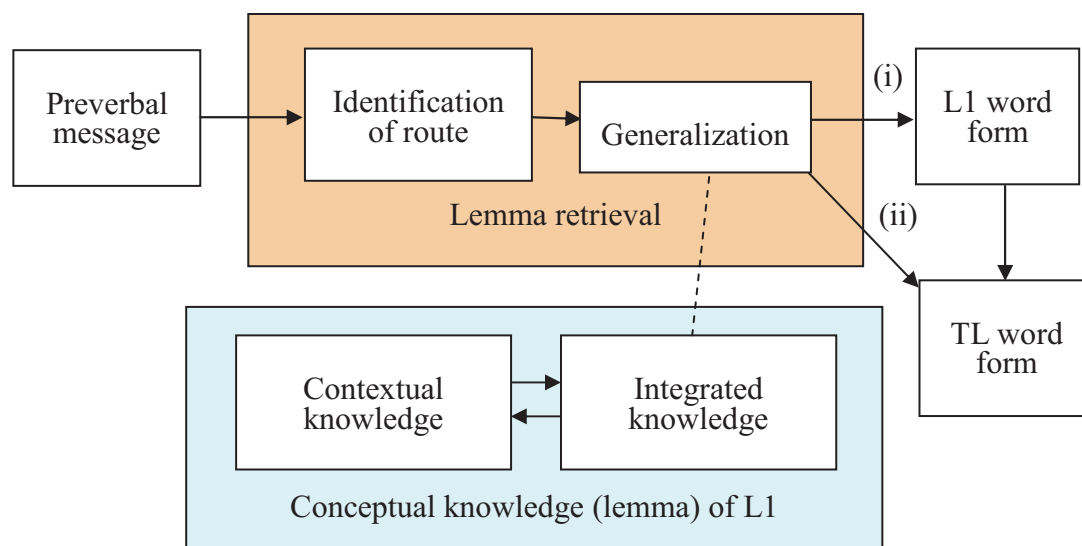
Figure 25: Speech production model according to the shared lexicon theory ((i) = lexical mediation; (ii) = conceptual mediation).

As noted in Section 2.1, it is unclear how the shared lexicon approach addresses the issue of accuracy and efficiency during lexical selection in the event of an L1 corresponding to multiple TL words. Based on the logic of the shared lexicon theory, it is predicted that learners may mistakenly retrieve the TL word that is most typically linked to a particular L1. In the context of the present study, apart from accessing to a TL lexicon (Figure 24), the possibility of learners making a direct access to an L1 lexicon as shown in Figure 25 is not ruled out; however, such access is viewed as a result of the evocation of an L2 translation typically co-occurring with a particular L1 (thus the strongest connection), rather than owing to a shared lexicon. In that case, lexical access is faster and effortless because lemma retrieval is made via an L1 route, and all it takes is the reaction time to evoke the corresponding translation (i.e. L2 equivalent). Such approach, however, hinders learners from retrieving the correct lexical item when there is more than one L2 equivalent for a particular L1 word. It is thus predicted that advanced learners who are conscious about their language use are more inclined to opt for access to TL lexicon over a literal equivalent to ensure accuracy of production.

The distinction made between conceptual access to an L2 lexicon and retrieval via an L1 lexicon allows the model to accommodate different kinds of learning and make interesting predictions about the speed of retrieval. To begin with, as pointed out in Section 2.1, the conventional studies of the bilingual mental lexicon using reaction-based tasks fail to explain how learners produce the appropriate word in cases where the typical translation equivalent appears not to fit into the context. While the participants in these studies demonstrated more rapid L1 to L2 translation than picture naming, the present model predicts the opposite result for context-based tasks. The process of translation entails, first, the interpretation of the original text by converting it into the form of a preverbal message (a process equivalent to instantiation according to R. C. Anderson's term), subsequently followed by the retrieval of the target word via a series of steps as illustrated in Figure 24. Picture naming, on the other hand, involves only the latter and thus is faster than translation. This explains why even fluent bilinguals who are highly proficient in the L2 may encounter difficulty in translation of interpretation tasks, and mistakenly produce translations that retain the structure of the original text (of the source language) due

to interference that occurs during the construction of the referential situation (instantiation). However, the laborious double conversion—from the original text to the preverbal message, and subsequently to the target text—is not the only way to produce an appropriate translation. Translation experts may resort to "shortcuts" by accessing non-literal translation equivalents usually involving units larger than lexis, by virtue of their large inventory of such associations[27]. In that case, translation is said to benefit from a direct access via form-to-form linkage as shown in Figure 25. The connection between L1 word form and L2 word form has another implication in production. Instead of producing a meaning-related translation equivalent, association on the word form level may also lead to the production of a form-related word. For instance, while the Chinese word *yi4 wai4* 意外 (accident) is most commonly associated with the Japanese word *jiko* 事故, a Chinese-speaking learner of Japanese who fails to recall this association may mistakenly retrieve the word *igai* 意外 (surprisingly) due to structural similarity. In relation to this, the findings reported by De Groot (1992, 1993) that cognates are translated faster than non-cognates can be re-interpreted as a result of stronger connection due to the overlapping of both concept and form, according to a connectionist viewpoint.

Other access routes may include the search for conceptually related lexical items (i.e. synonym) either in the L1 or L2 lexicon, owing to interlexical association. However, such approach is viewed as a kind of makeshift communicative strategy adopted when learners fail to recall the intended lexical item, and therefore will not be discussed at length here.

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[27] Similarly, the presence of an association between an L2 word and its L1 equivalent makes literal translation available, providing a short-cut for learners whenever they encounter difficulty in accessing the target word via a direct L2 route, however, sometimes at the expense of accuracy.

5. Questionnaire survey

5.1 Background of the experiment

In SLA, studies of the erroneous language use produced by L2 learners typically distinguish between what has been termed as "error" and "mistake" (see, e.g., Corder, 1967; Ellis, 1994). According to Corder (1967), an error is a deviation from the norms that reflects the lack of knowledge, whereas a mistake occurs when learners fail to perform their competence, as a result of processing problems. Since the ultimate objective of the study of error is to determine the source of error thereby establishing the processes that underlie competence, most scholars maintain that competence error (as opposed to performance mistake) should be the central issue to the study of SLA. However, although these studies—from Contrastive Analysis (CA) to Error Analysis (EA)—have illuminated how errors are produced by suggesting different possible causes such as transfer, overgeneralization, incomplete application of rules, etc. (see, e.g. Lott, 1983; Richards, 1971), they do not shed light on how *not* to produce errors. In other words, these studies fail to demonstrate the process through which learners achieve the ultimate target of accurate use (adequate competence). This shortcoming is believed to stem from the nature of error and the methodology to study it. Since learners have yet to acquire the correct form, the only possible means to bridge the gap is to resort to whatever resource that is available, such as L1 knowledge and other L2 words, whether or not learners are aware that the production is an erroneous one[28]. Categorization of the causes of error is least helpful in constructing the dynamic cognitive processes that lead to success in acquisition, because such method merely focuses on the product of a particular stage. Without a formal model, these studies remain descriptive and lack the capacity to make predictions concerning the behavior or performance that learners may exhibit at different stages of acquisition. Another fundamental problem of EA is that it makes no attempt in accounting for the development of automaticity which is a vital component if the complete picture of acquisition were to be uncovered.

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[28] If they are, the error should be treated as a communicative strategy that does not necessarily represent the knowledge structure.

Performance mistake, on the other hand, has been widely researched in the field of L1 acquisition under headings such as "speech errors" and "slips of the tongue". These mistakes are often characterized by an incidental nature and are thus ascribed to processing problem rather than to the conceptual structure. In the case of L2 learners, however, it is common for learners to repeat the same mistake despite knowing the correct word (see, e.g., Poulisse, 1999). Some mistakes not only recur within an individual learner but are also observed among other learners, and may persist through stages of acquisition. Thus it is my contention that such performance mistakes which show a great deal of systematicity may serve as an invaluable tool to probe into the cognitive processes of acquisition and the conceptual representation that give rise to these slips. The speed-accuracy trade-off observed in performance mistake serves as an ideal evidence to validate the present model.

As such, performance mistakes will be used to make the following inquiries:

1. Why do learners make erroneous production despite knowing the correct expression?
2. Why are some usages more likely affected by L1 than the others?

The goal of the study is to verify the mechanisms of acquisition and automatization postulated in Chapter 4, through the analysis of performance mistakes. Since the thesis is concerned with the acquisition of concept per se, only mistakes that occur at the stage of lemma retrieval will be considered (see Figure 23 and 24). As a working definition, performance mistake is defined as involuntary erroneous production which takes place during time-constrained productive activities which can be self-corrected by the learners. Theoretically, this should exclude cases in which learners consciously opt for an erroneous candidate due to the failure to recall the appropriate word. In that case, the selection of the erroneous word is no more than a communicative strategy and does not reflect the learner's conceptual structure.

5.2 Participants

All participants of the study are advanced learners or users of Japanese language who have passed the Japanese Language Proficiency Test Level 1 (highest level) and who have been using Japanese on a daily basis for at least 3 years. Such criteria

are a means to ensure that the subjects possess adequate competence in the Japanese language. All subjects only started learning Japanese after 18 except for two participants, one started at 13 while another at 16, both in a foreign language environment (as a subject at school).

Table 2: Details of the Japanese learners who participated in the present study.

Gender	Length of Japanese language learning (including using) (year)	Length of stay in Japan (year)	Nationality	Mother language (L1)
Female: 14 Male: 12	Maximum: 13 Minimum: 3.5 Average: 7.9	Maximum: 11 Minimum: 1.5 Average: 5.1	Malaysian :9 Taiwanese: 7 Chinese: 10	Mandarin

Table 3: Details of the Japanese native speakers who participated in the present study.

Gender	Birthplace	Age group	Social status
Female: 5 Male: 3	Osaka: 3 Kobe: 1 Nagasaki: 1 Miyazaki: 1 Yamaguchi: 1 Hiroshima: 1	20s: 5 30s: 3	Student: 3 Working: 5

5.3 Methodology and data collection

5.3.1 Material

The questionnaire consists of 40 questions that were designed in a way that relates to the subjects' L1 i.e. Mandarin (used interchangeably with Chinese). To illustrate this, take for example item no. 4 (see Table 4) in which the situation "I need to go now" is expressed as "*wo3 dei3 zou3 le*" in Chinese. The Chinese word "*zou3*" is most typically associated with the Japanese equivalence "*aruku*", thus the assumption is that learners may mistakenly produce "*mou arukanakucha*" for the correct expression "*mou ikanakucha*". 4 items (no. 2, 3, 22, and 30) were designed in the opposite direction, where it is assumed that mistakes occur despite corresponding well to the L1 equivalents.

A second type of mistake is one that arises because a particular distinction does not exist in the learner's L1, for instance, the Japanese word "*kiru*" and "*haku*" that are both equivalent to the word "*chuan1*" in Chinese. It should be noted that such categories merely serve as a guideline for the preparation of the questionnaire and have no significant influence on the experiment results, because all items are to undergo analysis using the same set of principles.

All items were presented in the participants' L1, i.e. Chinese language, in designated contexts that lead to arguably the same interpretations for all participants. For each item, six options were given as the answer to "have you ever made such mistake before": 1) Yes; 2) Maybe yes; 3) I do not remember well; 4) Maybe no; 5) No; and 6) I did not know the correct expression for this context.

The advantage of using questionnaire as the data collection method in this study is that compared to description tasks, it allows a large number of data on the same group of words to be collected easily. Moreover, not only can the occurrence of mistake be collected in the form of rate, data of non-occurrence can be obtained as well. This is particularly significant because a comprehensive model should be able to account for not only the occurrence of mistakes but the opposite as well. Another advantage which is critical for the present study is that it helps to distinguish between performance mistake and competence error. The disadvantage that is inherent in introspective methodology is the validity problem as to how far the self-reports made by the subjects reflect their actual experience. However, the legitimacy of such approach is justified by the fact that the present study only requires the participants to report on their language use rather than making access to deeper cognitive processes, and also the fact that L2 learning in the case of adult learners generally involves conscious processing.

5.3.2 Collection of benchmark data from native speakers of Japanese

As a means to establish a standard as to what constitutes an "erroneous production", eight native Japanese speakers have participated in the benchmark test consisting of two steps (see Appendix 1). First, the situations used in the questionnaire were presented to the Japanese speakers (in Japanese language) verbally, and they were requested to provide the most appropriate word that goes

with each context. In order to aid understanding, additional descriptions and gestures were used where necessary. The second step involves appropriateness judgment with the same set of items, in which the erroneous expressions (embedded in respective contexts) were presented to the same group of Japanese speakers, and they were asked to rate the acceptability of each usage by choosing from one of the following: 1) unacceptable (I have never used it this way); 2) I am not sure; and 3) acceptable (I sometimes use it myself).

5.3.3 Questionnaire survey

The data of performance mistakes is collected via questionnaire survey which contains two sections (see Appendix 2). In the first section, the equivalent task is comprised of the 40 Chinese words that appear in the Chinese contexts of the second section. For each item, the participants were told to write down one L2 translation equivalent that first crossed their minds. The stimuli were presented in isolated form without context so as to elicit the most typical translation equivalents for the words. No specifications were made except in cases where a distinction among noun, verb, or adjective is needed. In the second section (Table 4), the participants were informed that the purpose of the study is to examine performance mistake (as opposed to competence error) and were given explicit guidelines on what a performance mistake is.

Table 4: Items listed in the questionnaire

	Situation, erroneous production, and correct expression		Situation, erroneous production, and correct expression
1	情况：「（做仰卧起伏时）可以替我压着腿吗？」 「足を<u>押して</u>くれる？」 →押さえる	21	情况：「（雪糕尝了一口以后）香草的味道。」 「バニラの<u>におい</u>がする。」 →あじ
2	情况：「（书桌沾满了灰尘）快打扫一下吧。」 「早く<u>片付け</u>なさい。」 →掃除する	22	情况：「（刚洗完澡）等头发干了再睡吧。」 「髪の毛がもう少し<u>乾燥して</u>から寝よう。」 →乾く
3	情况：「这汉字怎么念？」 「この漢字は何と<u>発音する</u>？」 →読む	23	情况：「（跟人聊天时）说到兴起口水四溅。」 「<u>よだれ</u>を飛ばしてしゃべる。」

			→つば
4	情况：「（已经不早了）「我得走了。」 「もう<u>歩か</u>なくちゃ。」 →行く	24	情况：「（饮料）不要放冰块。」 「氷を<u>置か</u>ないでください。」 →入れる
5	情况：「（每天嚷着不要上学发脾气）小孩很讨厌上学。」 「子供が学校に行くのを<u>嫌って いる</u>。」 →嫌がる	25	情况：「穿裤子。」 「ズボンを<u>着る</u>。」 →履く
6	情况：「非常期待回国的日子。」 「帰国の日をすごく<u>期待してい る</u>。」 →楽しみにする	26	情况：「（你说话时）声音太大了。」 「<u>音</u>が大きい。」 →声
7	情况：「明天去（你家）找你。」 「明日<u>探し</u>に行く。」 →会う	27	情况：「小孩学东西很快。」 「子供が新しいことを<u>習う</u>のが早い。」 →覚える
8	情况：「（都快中午一点了）你还在睡哦？」 「<u>また</u>寝ているの？」 →まだ	28	情况：「（要过马路时）红绿灯开始闪了。」 「信号が<u>光っている</u>。」 →点滅する/もうすぐ変わる
9	情况：「开空调。」 「エアコンを<u>開ける</u>」 →つける	29	情况：「（打开冰箱一看）豆腐坏了。」 「豆腐が<u>壊れた</u>。」 →痛む/腐る
10	情况：「你打算把头发留到多长？」 「髪の毛をどこまで<u>残す</u>つもり？」 →伸ばす	30	情况：「（小孩要碰危险的东西）快阻止他！」 「はやく<u>やめて</u>！」 →とめる
11	情况：「（我也想去）带我去。」 「私を<u>持って</u>いってください。」 →連れる	31	情况：「必须均衡地摄取各种营养。」 「いろんな栄養素を<u>均等</u>に摂らなくちゃ。」 →まんべんなく/バランスよく
12	情况：「（某科目）得到了很不错的成绩或分数。」 「いい点数・成績を<u>もらっ た</u>。」	32	情况：「（下班后同事约你去唱K）不了，我要回家了。」 「いや、もう家に<u>戻る</u>。」 →帰る

	→取る		
13	情況：「（衣服沾了咖喱汁）这个能洗掉吗？」 「これは<u>洗える</u>？」 →取れる/落ちる	33	情況：「他被车撞了（现在躺在医院里）。」 「彼は車に<u>ぶつけられた</u>。」 →はねられる/ひかれる
14	情況：「（大热天刚从外边买回来的果汁先放到冰箱里）等凉了再喝。」 「<u>さめて</u>から飲む。」 →ひえる	34	情況：「把电脑带来吧。」 「パソコンを<u>連れてきて</u>。」 →持つ
15	情況：「（向某人）借了一本书。」 「本を<u>貸した</u>。」 →借りる	35	情況：「（一听见她有事）他就马上跑来了。」 「すぐ<u>走って</u>きた。」 →駆けつける/とぶ
16	情況：「（遇到不懂的生词时）找词典。」 「辞書で<u>探す</u>。」 →調べる・（辞書を）引く	36	情況：「（衣服的）颜色很浅。」 「色が<u>浅い</u>。」 →薄い
17	情況：「（气候异常）下起了冰雹。」 「雹が<u>下りて</u>きた。」 →降る	37	情況：「如火如荼地准备着后天的比赛。」 「明後日の試合に<u>向かって</u>一生懸命練習している。」 →向けて
18	情況：「（给朋友劝告时）你不应该这么做。」 「そんなことをする<u>はず</u>じゃない。」 →べき	38	情況：「（压力太大）掉了很多头发。」 「髪の毛がいっぱい<u>落ちた</u>」 →抜ける
19	情況：「（大冬天要洗澡，打开花洒却被淋了一身冷水时）好冷！」 「<u>寒い</u>！」 →冷たい	39	情況：「她比我大（三岁）。」 「彼女は私より三つ<u>大きい</u>。」 →上/年上
20	情況：「请按右上方的按钮。」 「右上のボタンを<u>押さえて</u>ください。」 →押す	40	情況：「随身携带防狼器以防万一。」 「万一に<u>向けて</u>防犯ブザーをいつも持ち歩いている。」 →備えて

5.4 Results and data analysis

To begin with, data of the benchmark test collected from native speakers of Japanese language indicates that all the candidates for incorrect use can rightfully be

considered as "mistakes" based on the following reasons[29]. First, according to the response elicited from these native speakers, none of the erroneous expressions was given as the "most appropriate word" in respective contexts. By viewing the elicited responses as the standard for the "correct use" of these words, and drawing on the working definition that "a mistake is a usage that deviates from the norm", it is justified that these items (i.e. the candidates for performance mistake) can be legitimately claimed as "mistakes". Additional support was derived from the subsequent appropriateness judgment task. The three levels of rating, i.e. 1) unacceptable; 2) I am not sure; and 3) acceptable, were given a point of 3, 2, and 1 respectively. For an item to be considered as a "legitimate mistake", it needs to score at least 16 or above (beyond uncertainty level, i.e. 2 points, from all 8 respondents). The test confirmed that all items received at least a score of 17 points or above (see Table 5).

Table 5: Results of acceptability judgment task.

No.	Item	Acceptance rate (out of 24 points)	No.	Item	Acceptance rate (out of 24 points)
1.	押す	24	21.	におい	24
2.	片付ける	24	22.	乾燥する	24
3.	発音する	21	23.	よだれ	24
4.	歩く	24	24.	置く	24
5.	嫌う	18	25.	着る	23
6.	期待する	23	26.	音	24
7.	探す	24	27.	習う	23
8.	また	24	28.	光る	23
9.	開ける	24	29.	壊れる	24
10.	残す	24	30.	やめる	24
11.	持つ	24	31.	均等に	22
12.	もらう	17	32.	戻る	23
13.	洗う	23	33.	ぶつける	20
14.	冷める	24	34.	連れる	24
15.	貸す	24	35.	走る	22
16.	探す	18	36.	浅い	24
17.	下りる	24	37.	向かう	21

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[29] There were altogether 43 items originally (see Appendix 1), but three have been eliminated from the questionnaire as they did not pass the benchmark test.

18.	はず	24	38.	落ちる	23
19.	寒い	23	39.	大きい	23
20.	押さえる	24	40.	向ける	24

Next, results of the two sections of the questionnaire survey are as shown in Table 6 and Table 7 respectively.

Table 6: Results of the equivalent task (the "incorrect word" is marked with an asterisk sign).

Stimulus	Response (L2 equivalent)	Person	%[30]	Stimulus	Response (L2 equivalent)	Person	%
1. 压 （动词）	*押す	16	61.5	22. 干 （形容词）	乾く	17	73.9
	押さえる	5	19.2		*乾燥する	4	17.4
	圧	2	7.7		乾かす	1	4.4
	押しつぶす	1	3.9		ドライ	1	4.4
	圧縮する	1	3.9	23. 口水	*よだれ	11	44
	押し込む	1	3.9		つば	11	44
2. 打扫 （动词）	掃除する	25	96.2		唾液	3	12
	*片付ける	1	3.9	24. 放	*置く	17	68
3. 念	読む	26	100		放す	7	28
4. 走	*歩く	21	80.8		ほっておく	1	4
	行く	3	11.5	25. 穿	*着る	19	76
	走る	2	7.7		付く	3	12
5. 讨厌	嫌い	17	65.4		着用する	1	4
	*嫌う	4	15.4		履く	1	4
	いや	4	15.4		通る	1	4
	嫌がる	1	3.9	26. 声音	*おと	19	73.1
6. 期待	*期待する	23	88.5		こえ	6	23.1
	楽しみにする	2	7.7		音声	1	3.9
	望む	1	3.9	27. 学	学ぶ	19	73.1
7. 找	*探す	26	100		*習う	5	19.2
8. 还(hai)	まだ	12	46.2		勉強する	2	7.7
	返す	9	34.6	28. 闪	*光る	5	21.7

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[30] The percentage was calculated by dividing the number of those who provided the "incorrect word" as translation equivalent by the number of valid answers (i.e. the number of participants who did provide an equivalent).

	*また	5	19.2		点滅する	4	17.4
9. 开	*開く	14	53.8		閃く	3	13
	*開ける	10	38.5		ピカピカする	3	13
	ひらく	1	3.9		きらきらする	3	13
	つける	1	3.9		フラッシュする	2	8.7
10. 留	*残す	10	40		避ける	1	4.4
	留める	7	28		瞬く	1	4.4
	*残る	5	20		まぶしい	1	4.4
	止まる	2	8	29. 坏了	*壊れる	12	48
	留まる	1	4		*壊す	12	48
11. 带（动词）	*持つ	16	61.5		悪い	1	4
	連れる	8	30.8	30. 阻止	とめる	15	60
	持参する	1	3.9		阻止する	5	20
	有する	1	3.9		とまる	1	4
12. 得到	*もらう	12	46.2		ストップする	1	4
	得る	9	34.6		制止する	1	4
	手に入れる	3	11.5		足を引っ張る	1	4
	ゲットする	1	3.9		防止する	1	4
	取る	1	3.9	31. 均衡	バランス	17	68
13. 洗	*洗う	26	100		均衡	3	12
14. 凉了	*冷める	16	64		*均等	2	8
	涼しくなる	4	16		均一	1	4
	冷たくなる	2	8		つりあい	1	4
	冷える	2	8		満遍なく	1	4
	寒い	1	4	32. 回	帰る	14	53.8
15. 借	借りる	25	96.2		回る	3	11.5
	*貸す	1	3.9		*戻る	3	11.5
16. 找	*探す	26	100		回	3	11.5
17. 下（动词）	*降りる	14	53.8		返す	1	3.9
	下る	7	26.9		回す	1	3.9
	下がる	2	7.7		返事する	1	3.9
	降る	1	3.9	33. 撞	*ぶつかる	23	92
	下す	1	3.9		打ち付ける	1	4
	下げる	1	3.9		突	1	4
18. 应该	べき	10	40	34. 带	持つ	16	61.5
	たぶん	7	28	（动词）	*連れる	8	30.8

	*はず	6	24		持参する	1	3.9
	しなければならない	2	8		有する	1	3.9
19. 冷	*寒い	23	88.5	35. 跑	*走る	24	96
	冷たい	3	11.5		駆ける	1	4
20. 按	押す	23	92	36. 浅	*浅い	26	100
	従う	1	4	37.	向かう	NA	NA
	による	1	4	38. 掉	*落ちる	16	61.5
21. 味道	味	22	84.6		*落とす	10	38.5
	*におい	4	15.4	39. 大	*大きい	26	100
				40.	向ける	NA	NA

Table 7: Results of the questionnaire survey on performance mistakes.

Performance mistake	Yes	No	Unsure	Did not know the correct expression
1. 押す	8	7	4	7
2. 片付ける	8	15	3	0
3. 発音する	12	13	0	1
4. 歩く	0	25	1	0
5. 嫌う	7	15	2	2
6. 期待する	12	11	3	0
7. 探す	1	24	1	0
8. また	2	24	0	0
9. 開ける	2	24	0	0
10. 残す	3	20	1	2
11. 持つ	0	26	0	0
12. もらう	9	13	3	1
13. 洗える	8	13	2	3
14. さめる	9	9	4	4
15. 貸す	5	20	0	1
16. 探す	10	15	0	1
17. 降りる	1	25	0	0
18. はず	3	21	1	1
19. 寒い	17	7	1	1
20. 押さえる	1	24	0	1
21. におい	6	18	2	0
22. 乾燥する	5	18	0	3
23. よだれ	4	17	2	3
24. 置く	0	26	0	0
25. 着る	14	10	1	1
26. 音	5	19	2	0
27. 習う	18	5	0	3

28. 光る	8	14	1	3
29. 壊れる	5	16	2	3
30. やめる	6	20	0	0
31. 均等	4	19	1	2
32. 戻る	7	19	0	0
33. ぶつける	13	6	1	6
34. 連れる	0	26	0	0
35. 走る	14	5	3	4
36. 浅い	6	18	2	0
37. 向かう	15	8	1	2
38. 落ちる	15	5	2	4
39. 大きい	3	23	0	0
40. 向ける	5	12	1	8

The Chinese language does not make explicit distinction between transitive and intransitive usage of verbs, hence responses that differ in this respect, such as "*kowasu*" and "*kowareru*" elicited from the stimulus "*huai4*" (item no. 29) were treated as the same word in the equivalent task. As for the second section concerning performance mistake, "yes" and "maybe yes" were classified as "yes" (positive response), whereas "no" and "maybe no" were classified as "no" (negative response) for the purpose of statistical analysis. Correlation analysis indicated that there was no significant correlation between the number of participants who provided the "incorrect word" as translation equivalent and the number of those who have experienced misproduction with these words (Spearman's rank correlation rho: S = 8125.456, p-value = 0.5074, alternative hypothesis: true rho is not equal to 0, sample estimates: rho 0.1109032). On the other hand, there was a positive correlation between the number of participants who have experienced the misproductions and the number of those who "did not know the correct use" (Spearman's rank correlation rho: S = 5414.015, p-value = 0.001258, alternative hypothesis: true rho is not equal to 0, sample estimates: rho 0.4921187).
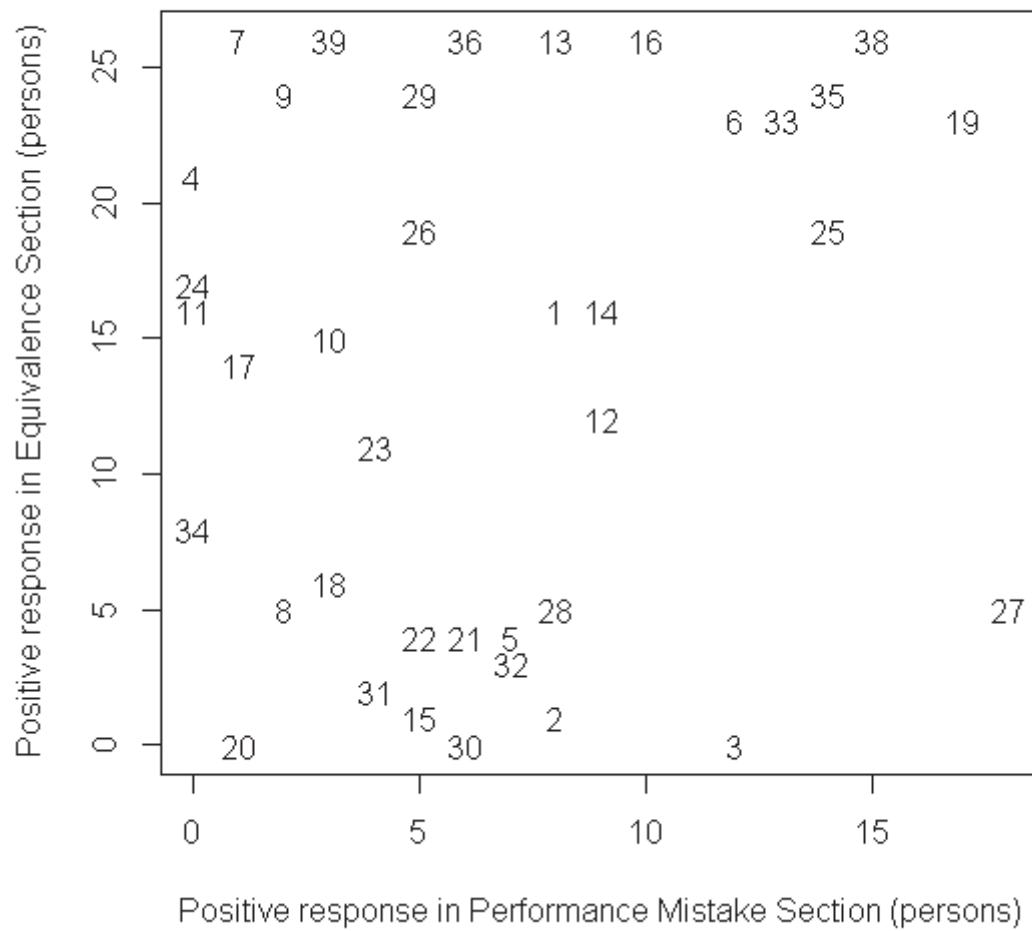
Figure 26: Correlation between the number of participants who provided a positive response (the total of "yes" and "maybe yes") regarding performance mistake and the number of participants who provided the "incorrect word" as translation equivalent. The numbers correspond to the order of the questionnaire items presented in Table 4.
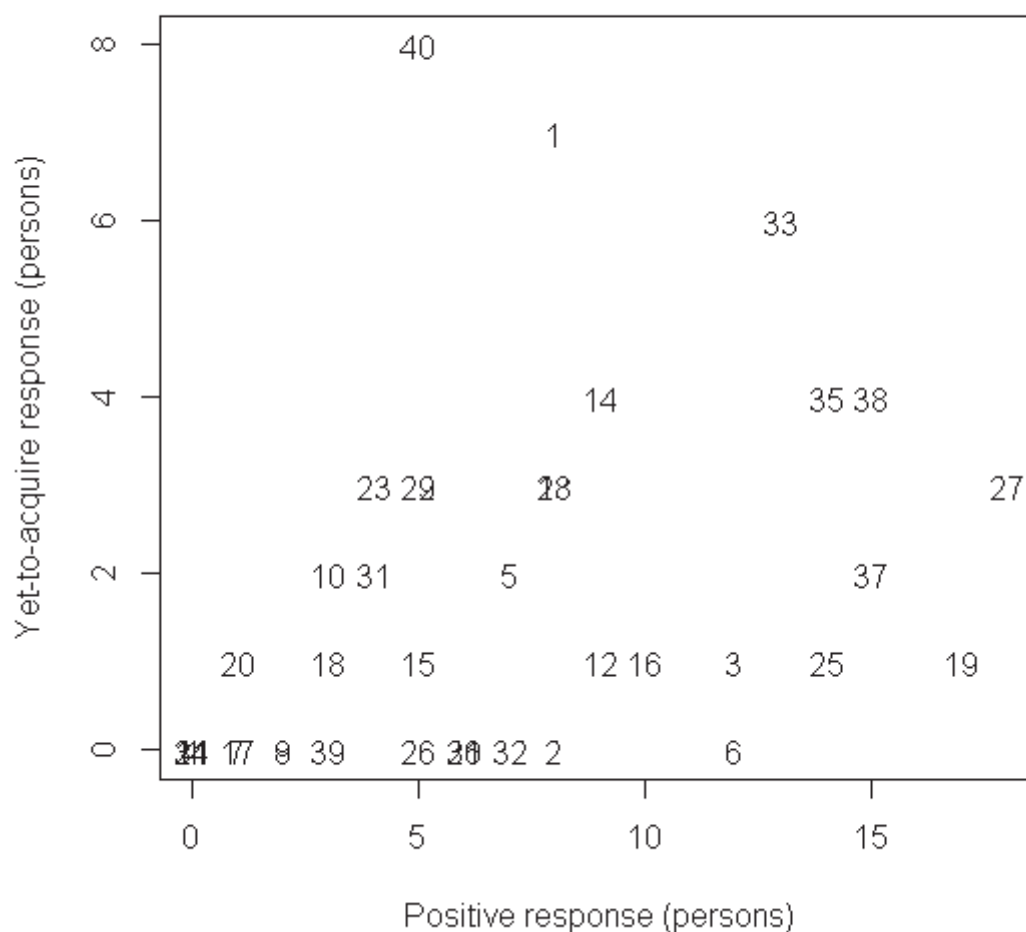
Figure 27. Correlation between the number of participants who provided a positive response (the total of "yes" and "maybe yes") regarding performance mistake and the number of participants who selected "I did not know the correct expression". The numbers correspond to the order of the questionnaire items presented in Table 4.

Another set of correlation analysis was carried out based on percentage in which the new statistical population was obtained by eliminating the number of participants who answered "I do not remember well" and "I did not know the correct use"[31]. Results of the mistake rates are shown in Table 8 in an increasing order (see

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[31] Some participants have reported that they knew both the "correct word" and incorrect word" and thought both were appropriate. In such cases, they were instructed to choose "yes", because performance mistake is very likely to persist

also figure 30). The correlation analysis shows the same tendency as above. There was no significant correlation between mistake rates and the percentage of participants who provided the "incorrect word" as translation equivalent (Spearman's rank correlation rho: S = 7795.234, p-value = 0.3784, alternative hypothesis: true rho is not equal to 0, sample estimates: rho 0.1470365), but a strong correlation was found between mistake rates and the percentage of respondents who "did not know the correct use"[32] (Spearman's rank correlation rho: S = 4392.59, p-value = 6.628e-05, alternative hypothesis: true rho is not equal to 0, sample estimates: rho 0.5879371).

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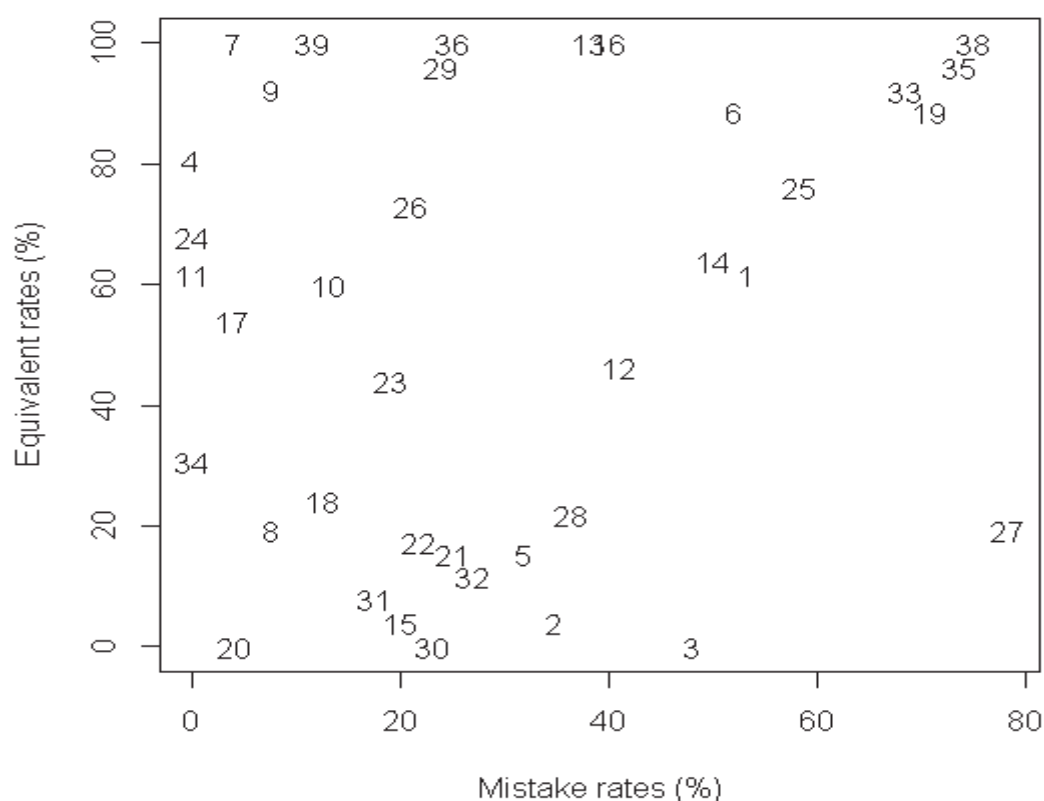
over a certain period of time even after the learners realized that it is in fact an inappropriate use.

[32] The percentage was calculated by dividing the number of those who answered "I did not know the correct expression" by the total number of participants i.e. 26.

Figure 28. Correlation between mistake rates and the percentage of participants who provided the "incorrect word" as translation equivalent. The numbers correspond to the order of the questionnaire items presented in Table 4.
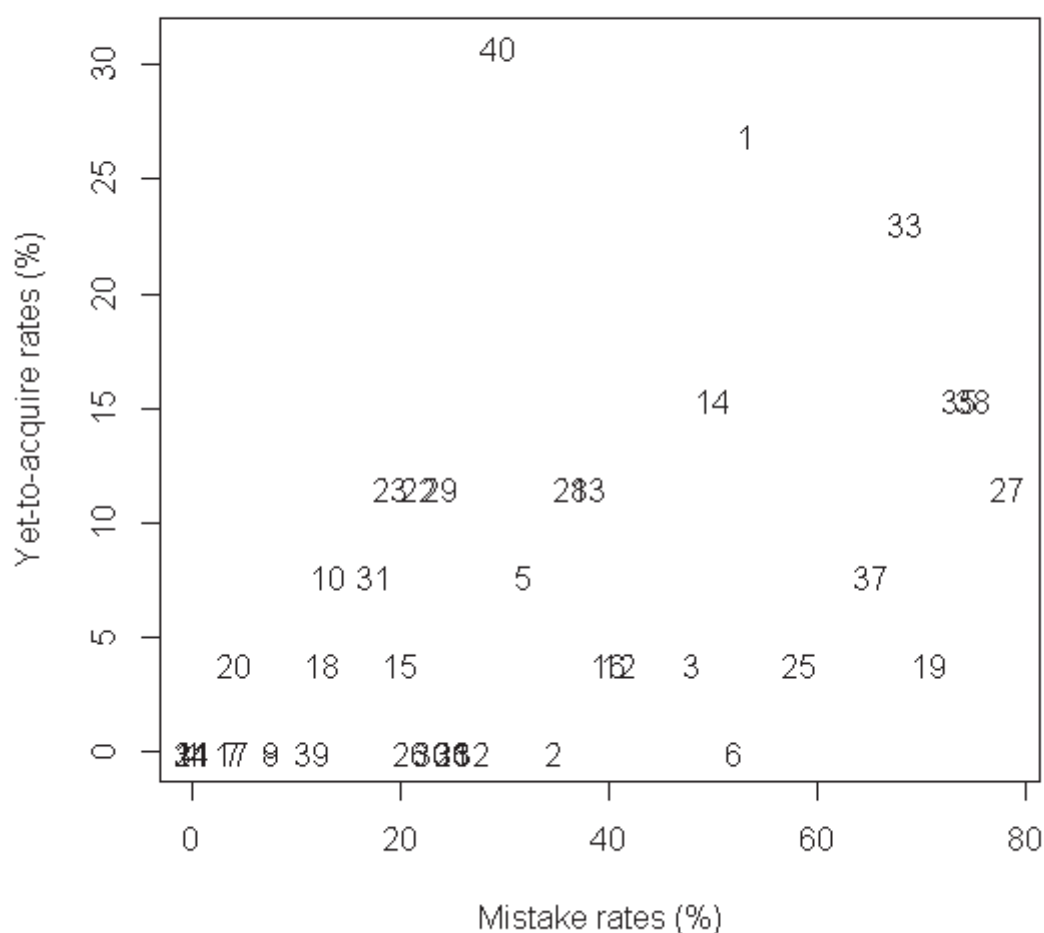
Figure 29: Correlation between mistake rates and the percentage of participants who selected "I did not know the correct expression". The numbers correspond to the order of the questionnaire items presented in Table 4.

Table 8. Mistake rates (rearranged by increasing order)

No.	Word	Performance mistake (%)	No.	Word	Performance mistake (%)
1.	歩く	0	21.	浅い	25
2.	持つ	0	22.	戻る	27
3.	置く	0	23.	向ける	29

4.	連れる	0	24.	嫌う	32
5.	降りる	4	25.	片付ける	35
6.	探す	4	26.	光る	36
7.	押さえる	4	27.	洗える	38
8.	また	8	28.	探す	40
9.	開ける	8	29.	もらう	41
10.	大きい	12	30.	発音する	48
11.	はず	13	31.	さめる	50
12.	残す	13	32.	期待する	52
13.	均等	17	33.	押す	53
14.	よだれ	19	34.	着る	58
15.	貸す	20	35.	向かう	65
16.	音	21	36.	ぶつける	68
17.	乾燥する	22	37.	寒い	71
18.	やめる	23	38.	走る	74
19.	壊れる	24	39.	落ちる	75
20.	におい	25	40.	習う	78
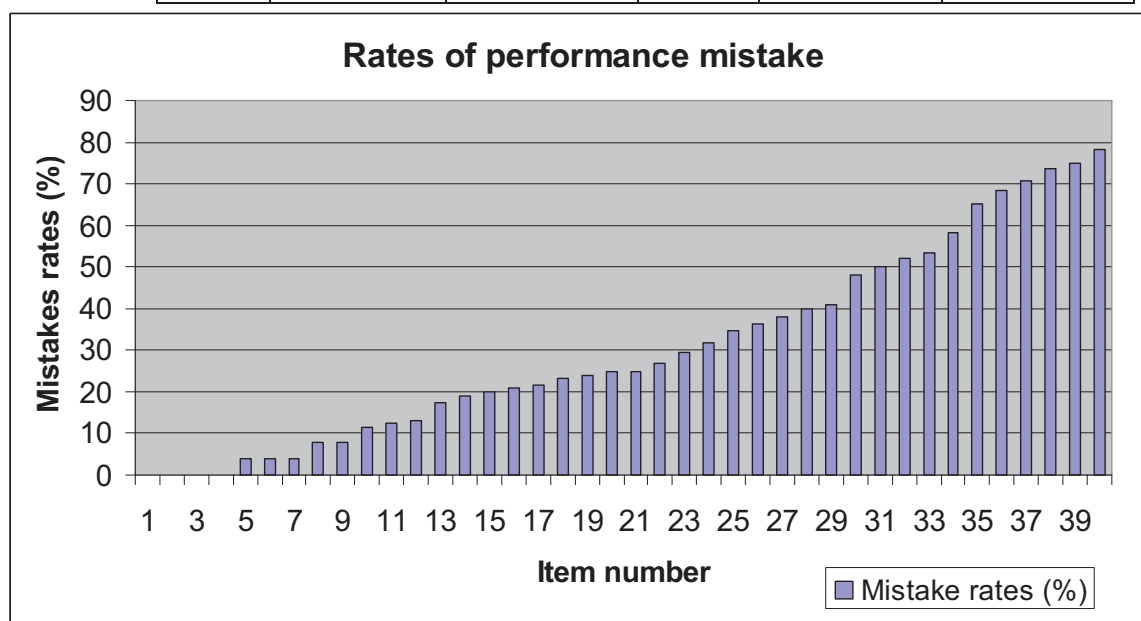
Figure 30. Rates of performance mistake

5.5 Discussion

The present survey has attempted to investigate the use of L1 knowledge in acquisition, apart from validating the development of automaticity. It is for this reason that the questionnaire items were designed by assuming some relationship with the L1. However, this is by no means implying that the causes of mistakes are

all attributable to the L1; it is the aim of the analysis to find out *how*, in what ways the L1 could contribute to these mistakes.

In the present study, it is assumed that all performance mistakes take place at the stage of lemma retrieval rather than during phonological encoding (see Figure 23). In other words, the underlying cause should be concept-related rather than attributable to form-meaning linkage. The assumption is justified on the basis as follows. First, the word pairs (incorrect word and the correct target word) selected for the survey are barely similar to one another in terms of phonology, except for the pairs "*mata*" and "*mada*", and "*asai*" and "*usui*". Second, a strong linkage between form and meaning (concept) does play a vital role in ensuring a fluent and accurate production, and the lack of automaticity in phonological encoding (as well as in the other subsequent processes) will undoubtedly cause hindrance to the production of a lexical item as a complete utterance. For instance, when a learner fails to retrieve the correct form for an intended meaning, he might end up producing an incorrect word which shares similarity in form with the target word (e.g. "*kagu*" for "*kogu*"), or opt for a completely different expression (as a compensatory strategy) to bridge the gap. However, the difficulty in word form retrieval is more likely to arise in cases such as when the word contains many syllables, is difficult to pronounce, or has only been learned recently. Among the words used in the present study, all except the compound verb "*kaketsukeru*" are basically learned in the intermediate or beginner level, and are not significantly difficult to pronounce in terms of phoneme and syllable length. In the case of incidental "slip of memory", a vast individual difference will be anticipated and the tendency shown in the current results would not be obtained, thus such probability can be ruled out.

Next, the results of the questionnaire survey will be discussed. A shared lexicon model such as that of Pavlenko (2009) would predict that the L2 word that is most strongly bound to the L1 stimulus is most likely to be invoked thereby leading to performance mistake[33]. However, according to the results of correlation analysis

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[33] Such prediction was not made directly by researchers who espouse the shared lexicon theory because these models are not concerned with the issue of automaticity development. However, prediction based on the argument of shared

(see Figure 26 and 28), there was no significant interrelation between L1-L2 strength (as suggested by the result of the equivalent task) and mistake rates, implying that advanced learners (i.e. the participants) do not rely on L1 lexicon for production (Figure 25). Rather, the results have substantiated the hypothesis that the connection between L2 words and their L1 equivalents can be established in the mind, but is not necessarily activated during production. Learners do indeed possess a separate L2 lexicon that enables accurate language use.

On the other hand, the strong correlation between mistake rates and the rates of participants who have yet to acquire adequate knowledge of a particular usage of a word indicates that competence and automaticity are inextricably related to one another (see Figure 27 and 29). In practice, there is hardly a clear demarcation between competence and automaticity, because they most likely develop on the same continuum and progress simultaneously as demonstrated in Figure 21. In certain cases, learners are able to self-correct almost instantly after the mistake is produced, while in others, they may take longer time to figure out the appropriate word. It is apparently inappropriate to assume that learners are at the same stage of acquisition when the automaticity of production varies greatly. Meanwhile, it is unrealistic, if not impossible, to identify the 'endpoint' of competence alone, as it overlaps with the development zone of automaticity. Therefore, acquisition models which are not able to account for automaticity can be said to be theoretically flawed.

In the following discussion, mechanisms that lead to the occurrence (and non-occurrence) of performance mistake will be described using the acquisition model proposed in Chapter 4. The potential routes of access for a particular usage will be predicted based on the three factors as follows:

- Accuracy (knowing the most appropriate word for the situation in question)
- Principle of economy (efficiency of learning; coverage area)
- Ease of access (automaticity)

In principle, L1 transfer will be favored as long as accuracy and efficiency are not impaired. The possibility of L1 transfer will be examined on two levels:

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lexicon approach can be made by drawing on the notion of connectionism, as described in Section 4.4.

contextual level (the formation of a separate category adopting the L1 route) and integrated level. In cases where transfer can be made at the integrated knowledge level, the priority goes to that (as opposed to transfer at contextual level) according to the economy principle. The possible routes for a single usage may include an isolated route (category) and an integrated route (category) registered under the correct word, an integrated route registered under the incorrect word, and a direct access via the L1 lexicon (which is eliminated from the present discussion due to the above-mentioned reason). A rough guideline for the procedures for analysis is as follows, but the order is subject to alteration for the ease of discussion:

1. Question: Is there a possibility of transfer at the integrated level (for both the correct word and incorrect word)?

   ▪ Hypothesis: If yes, check no. 3 and 4; if no, check no. 2, predict a novel integrated structure and check no. 4.

2. Question: Is there a possibility of transfer at the contextual level (for the correct word)?

   ▪ Such transfer does not contribute directly to the occurrence of mistake, but the existence of a transferred route will have an impact on the overall conceptual representation and activation (during retrieval).

3. Question: Is the usage in question prototypical of the incorrect word?

   ▪ Hypothesis: If yes, error rate is likely to be higher than when it is the opposite.

4. Question: Is there any shared element(s) between structures of the correct word and incorrect word?

   ▪ Hypothesis: If yes, error rate is likely to be higher than when it is the opposite.

In general, the discussion will follow an increasing order of mistake rates (Table 8), but there may be some exceptions for the ease of presentation. The numbers in brackets that follow the word 'Situation' in each example correspond to those in Table 4.

1. Situation (24): '*(Yin3 liao4) Bu2 yao4 <u>fang4</u> bing1 kuai4*.'
   Literally: 'Please do not <u>put</u> ice (in my drink).'
   Erroneous expression: '*Koori wo <u>okanaide</u>* (ori.: *oku*) *kudasai.*'

Correct expression: '*Koori wo <u>irenaide</u>* (ori.: *ireru*) *kudasai*.'

In the equivalent task, 68% respondents provided the L2 word *oku* for the L1 cue word *fang4*. Despite the high co-occurrence between the two words, none of the respondents (0%) claimed to have made such performance mistake. This provides strong evidence for the argument that advanced learners indeed access a novel L2 conceptual structure rather than the L1 lexicon.

To begin with, the concept of *fang4* is unlikely to be transferred as a whole (i.e. transfer at the integrated level) to the word *oku* due to dissimilarity in structure and the range of referents. The word *fang4* refers to the motion of 'letting go' which corresponds not only to *oku* but also a number of other L2 words such as *hanatsu*, *hanasu*, and *nigasu*.

Next, the probability of a distinct context-dependent category (i.e. transfer at the contextual level) employing the L1 concept of *fang4* being formed (as follows) is examined.

- *Ireru*: 'insert (*fang4*) ice into a drink'

Learners are unlikely to form such a category for the following reasons. In order to differentiate *ireru* from *noseru*, *tsumeru*, *oku*, etc.—all of which may be associated with *fang4* in various contexts—each usage needs to be encoded in a rather specific (i.e. highly context-dependent) manner.

- *Tsumeru*: 'put (*fang4*) too much of filling into a bun'
- *Ireru*: 'add (*fang4*) some spice to the dish'
- *Noseru*: 'add (*fang4*) some topping to the steak'
- *Kakeru*: 'add (*fang4*) some sauce to the steak'

This results in a vast number of categories in order to cover a considerable range of usage associated with *fang4* alone, and even more if other L1 equivalents of *ireru* as well as other L1 concepts associated with each of these L2 words were to be taken into consideration. The resemblance among these categories renders the conceptual structure highly inefficient and thus is not likely to be adopted by learners. Likewise, a separate category adopting the route of *fang4* is undesirable for the word *oku* due to the same reason.

On the other hand, the integrated categories for *ireru* and *oku* are assumed as follows.

- *Ireru*: 'insert something into something'
- *Oku*: 'place something onto something'

The core feature that distinguishes between *ireru* and *oku*, i.e. whether the motion is performed "into" or "onto" something, is not difficult to acquire as the L1 concepts "(verb) *jin4*" ("into") "(verb) *shang4*" ("onto") can be readily transferred to the new conceptual structures. The inexistence of the route of *fang4* in neither *oku* nor *ireru*, as well as the ease of conceptualization for *ireru* explains why none of the respondents have experienced such mistake.

2. Situation (11): '*Dai4 wo3 qu4.*'

   Literally: '<u>Bring</u> me along.'

   Erroneous expression: '*Watashi wo <u>motte</u>* (ori.: *motsu*) *itte.*'

   Correct expression: '*Watashi wo <u>tsurete</u>* (ori.: *tsureru*) *itte.*'

3. Situation (34): '*Ba3 dian4 nao4 <u>dai4</u> lai2 ba.*'

   Literally: '<u>Bring</u> your laptop.'

   Erroneous expression: '*Pasokon wo tsurete* (ori.: *tsureru*) *kite.*'

   Correct expression: '*Pasokon wo <u>motte</u>* (ori.: *motsu*) *kite.*'

As an equivalent for the L1 word *dai4* ('bring'), 61.5% answered *motsu* ('bring something') and 30.8% *tsureru* ('bring someone'). This shows that *dai4* typically corresponds to these two words and is congruent with the fact that whether bringing an "inanimate object" (*motsu*) or a "living thing" (*tsureru*) is not distinguished in Chinese. While it is commonly predicted that learners are prone to mistakenly produce one for another, this was not the case as observed in the present survey (0% mistake rate was obtained for both example 2 and 3). The integrated categories of *tsureru* and *motsu* are presumably as follows:

- *Tsureru*: 'bring (*dai4*) someone (human or animal)'
- *Motsu*: 'have something in belonging'

The L1 concept *dai4* ('bring') may serve as a constituent (i.e. element) in the encoding of *tsureru* to form an adequate integrated knowledge. *Motsu*, on the other hand, contains a much wider range of usage that includes the scope of 'possess' (*you3*), 'bring' (*dai4*), 'hold' (*na2*), and several others. These concepts are not exclusively associated with *motsu*, but crisscross with yet a number of other L2 words in a complicated fashion. For instance, apart from *motsu*, *na2* is also

associated with *toru* ('take') and *watasu* ('hand something over'), etc., which are in turn connected to other L1 concepts.

- *Na4 ge ni3 na2 qu4 ba*→*Are wo motte itte ii yo* (Take that with you)
- *Na4 ge na2 guo4 lai2 yi2 xia*→*Are wo totte kite* (Please take that over here)
- *Qing3 ba3 na4 ge na2 gei3 wo3*→*Are wo watashite kudasai* (Please pass me that)

The closely related meaning among these concepts makes it impossible to form a clear-cut category adopting the L1 concept *dai4* (as follows) without compromising the accuracy of production.

- *Motsu*: 'bring (*dai4*) something'

Any attempt to form a more specifically defined category by formulating a more restricted, context-dependent usage will result in a vast number of categories resembling one another, as with the case of example 1. Therefore, the possibility of utilizing *dai4* in the conceptual structure of *motsu* is denied, and as a consequence, learners are unlikely to mistake *motsu* for *tsureru* (example 2) and vice versa (example 3) despite their seeming similarity.

4. Situation (17): '*Xia4 qi3 le bing1 pao2.*'

   Literally: 'It is hailing out there.'

   Erroneous expression: '*Hyou ga orite* (ori.: *oriru*) *kita.*'

   Correct expression: '*Hyou ga futte* (ori.: *furu*) *kita.*'

Result of the equivalent test indicates that among the 6 words provided by the participants as the equivalence for *xia4*, *oriru* appears to be the most prototypical with a response rate of 53.8%. In contrast to this, only 1 respondent (3.9%) provided *furu* in the equivalent test. Despite the stronger linkage between *oriru* and *xia4*, mistake rate for the above example was as low as 4%.

The integrated categories of *oriru* and *furu* are predicted as follows.

- *Oriru*: 'Move from a higher place to a lower place'
- *Furu*: 'Fall from the sky'

Both concepts, although difference between which is not required in the Chinese language, can be expressed by the Chinese word *xia4*. In other words, these categories are encompassed in the concept of *xia4* and can rightfully be perceived as lower categories of the concept *xia4* which can be transferred to the novel concepts

of *oriru* and *furu* respectively. Therefore, acquisition and internalization of these L2 words are like to be complete at a relatively early stage of learning, which explains for the low mistake rate.

Similar items in which two L2 words are expressed by one same L1 word include *oto* ('sound') and *koe* ('voice') for *sheng1 yin1* (21%); *kariru* ('borrow from') and *kasu* ('lend to') for *jie4* (21%); *nioi* ('smell') and *aji* ('taste') for *wei4 dao4* (26%); *sameru* ('cool off') and *hieru* ('get chilly') for *liang2 le* (50%); *kiru* ('wear') and *haku* ('wear') for *chuan1* (58%); *samui* ('cold') and *tsumetai* ('cold') for *leng3* (71%). Although these items may appear to be similar in terms of the cause of mistake, the varying mistake rates may imply some differences in the underlying mechanism.

5. Situation (26): '*Ni3 shuo1 hua4 sheng1 yin1 tai4 da4 le*.'

   Literally: 'Your <u>voice</u> is too loud.'

   Erroneous expression: '*Oto ga ookii*.'

   Correct expression: '*Koe ga ookii.*'

The response rates of *oto* and *koe* as an equivalent for *sheng1 yin1* were 73.1% and 23.1% respectively. Owing to the previously learned concept *sheng1 yin1*, learners are most likely to encode these L2 words as follows.

- *Koe*: 'sound (*sheng1 yin1*) produced by an animate subject'
- *Oto*: 'sound (*sheng1 yin1*) produced by an inanimate subject'

These structures may not coincide with those of native speakers of Japanese, who presumably encode these words as, say, 'the sound produced through one's mouth' and 'something one hears', but are adequate to distinguish one from another so as to enable learners to produce appropriately. Despite the ease of acquisition with the aid of such L1 concept, performance mistake persists among advanced L2 learners at a considerable rate of 21%. Such mistake can be said to stem from the discrepancy in the degree of internalization, where the previously learned element (i.e. *sheng1 yin1*) is more internalized than the newly formed element (i.e. 'produced by an (in)animate subject'), causing dissociation between the two elements during

production due to varying speed of access. As a result, *koe* and *oto* will be mistakenly produced for one another[34].

The four following items all exhibit a mechanism similar to example 5, in which each pair of L2 words share a mutual L1 element which is more internalized than the newly established element, causing dissociation during lemma retrieval. All of the word pairs below not only benefit from the transfer of L1 concept, but can also be easily represented in an explicit form and thus are easy to acquire.

6. Situation (23): '*Shuo1 dao4 xing4 qi3 kou3 shui3 si4 jian4.*'

    Literally: 'Spray spit as one talks.'

    Erroneous expression: '*Yodare wo tobashite shaberu.*'

    Correct expression: '*Tsuba wo tobashite shaberu.*'

- *Tsuba*: '*Kou3 shui3* that forms naturally in one's mouth'

- *Yodare*: '*Kou3 shui3* that drips from one's mouth'

7. Situation (15): '*Xiang4 bie2 ren2 jie4 le yi4 ben3 shu1.*'

    Literally: 'Borrowed a book from someone.'

    Erroneous expression: '*Dare ka kara hon wo kashita* (ori. *kasu*).'

    Correct expression: '*Dare ka kara hon wo karita* (ori. *kariru*).'

- *Kariru*: '*jie4* from someone'

- *Kasu*: '*jie4* to someone'

8. Situation (21): '*(Xue3 gao1 chang2 le yi4 kou3 yi3 hou4) Xiang1 cao3 de wei4 dao4.*'

    Literally: '(Upon taking a lick of an ice cream) It is vanilla flavor.'

    Erroneous expression: '*Banira no nioi da.*'

    Correct expression: '*Banira no aji da.*'

- *Aji*: '*wei4 dao4* sensed via the tongue'

- *Nioi*: '*wei4 dao4* sensed via the nose'

9. Situation (25): '*Chuan1 ku4 zi.*'

    Literally: 'Put on trousers.'

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[34] In cases where one of the two words is more strongly associated with the element *sheng1 yin1*, it will be produced more often than the less strongly associated word, resulting in a biased mistake rate.

Erroneous expression: '*Zubon wo kiru*.'

Correct expression: '*Zubon wo haku*.'

- *Haku*: 'wear (*chuan1*) on the lower body'
- *Kiru*: 'wear (*chuan1*) on the upper body'

The mistake rates of all of these pairs remain at a stable range of around 19%-30%, with example 9 being the only exception (58%). This can be attributed to the more frequent use of *kiru* for shirt, blouse, dress, and other clothes in general, in comparison to *haku* for trousers and skirt. Not only does the imbalance cause the element 'wear (*chuan1*)' to be more strongly associated with the form *kiru*, but the higher success rate (compared to pairs with more balanced frequency of use) achieved with the element 'wear' alone may also further discourage learners to strengthen the element of 'on the lower body' or 'on the upper body'. These factors together contributed to the high mistake rate of example 9.

More supporting evidence for the above discussed mechanisms is obtained from the following contrasting example.

10. Situation (18): '*Ni3 bu4 ying1 gai1 zhe4 me zuo4*.'

Literally: 'You shouldn't do that.'

Erroneous expression: '*Sonna koto wo suru hazu janai*.'

Correct expression: '*Sonna koto wo suru beki janai*.'

Hazu and *beki* are both equivalents of *ying1 gai1,* as indicated by the result of the equivalent test. The conceptual structures of *hazu* and *beki* can be represented (in learners' L2 lexicon) most efficiently in the following forms:

- *Beki*: 'it is appropriate to do something in a particular way'
- *Hazu*: 'something is supposed to happen in a particular way by rights'

Unlike the previous examples, these structures do not share a mutual element that constitutes the core of these concepts. This implies an important consequence: there will be no extreme discrepancy in internalization between elements caused by transfer since both categories need to be established from scratch. Therefore, even though in certain occasions learners may experience difficulty in deciding whether a situation should be perceived as a 'subjective opinion' (*beki*) or an 'objective judgment' (*hazu*) thereby resulting in mistakes, such mistakes are less likely to persist (as compared to those in example 5-9) especially considering the frequent use

of these words that greatly accelerates the speed of internalization. This explains why the mistake rate of the above example (13%) is lower than that of those previously discussed.

11. Situation (22): '*(Gang1 xi3 wan2 zao3) Deng3 tou2 fa4 <u>gan1</u> le zai4 shui4 ba*.'

    Literally: '(After shower) Go to bed after your hair <u>dries</u>.'

    Erroneous expression: '*Kami no ke ga <u>kansou shite</u> (ori. kansou suru) kara neyou*.'

    Correct expression: '*Kami no ke ga <u>kawaite</u> (ori. kawaku) kara neyou*.'

In the learners' L1, *gan1* (干) and *ganzao4* (干燥) correspond roughly to *kawaku* (乾く) and *kansou suru* (乾燥する) respectively, including the above usage. If the learners had acquired these L2 words on the basis of one-to-one equivalent, the above mistake should not have occurred. The mistake rate of 22% implies that learners might have indeed avoided such approach, considering some potential inconsistency as follows that may lead to incorrect use.

- '*Hong1 <u>gan1</u> le de dou4 zi*' (roasted dried beans): '*<u>Kansou saseta</u> mame*'
- '*Tou2 fa4 hen3 <u>gan1</u> (gan1 zao4)*' (hair is dry, for instance due to overexposure to chlorine): '*Kami no ke ga <u>kansou suru</u>*'

Such discrepancy partly stems from the syntactical difference between the two languages. The word *gan1* in Chinese language can be used to express the change of state from damp to dry (i.e. *kawaku*) when used with *le* (indicates completion of action), and the condition of lack of moisture (i.e. *kansou suru*) when used with *hen3* ("very") or other adverbs. Whatever the cause is, learners who are conscious of their language use are likely to develop novel integrated knowledge as follows.

- *Kawaku*: 'lose moisture on the surface'
- *Kansou suru*: 'lose moisture from the inner part'

Learners may not encounter much difficulty in forming these structures as they resemble what learners have acquired about *gan4* and *gan1 zao4*. However, since the referents of the L1 words and their L2 equivalents do not coincide perfectly, the more salient element 'lose moisture' may be accessed faster than its less salient counterpart, resulting in the above mistake. An important point made here is that whether or not an element originates from a previously learned L1 concept (for

instance, *jie4*, *wei4 dao4*, *chuan1* in example 7-9) is not the main issue; rather, it is the incomplete internalization (i.e. integrated knowledge-dominant state) causing dissociation between elements during time-constrained retrieval that matters. In other words, while performance mistakes may be attributable to the use of L1 concepts (in the form of an element) which causes discrepancy in internalization, the mechanism is not limited to concepts which involve the use of L1 but is equally applicable to lexical items non-relevant to the L1. A similar example is shown below, besides providing more evidence for the argument that learners refrain from accessing the L1 lexicon.

12. Situation (30): '*(Xiao3 hai2 yao4 peng4 wei1 xian3 de dong1 xi) Kuai4 <u>zu3 zhi3</u> ta1!*'

    Literally: '(A toddler was about to reach for something hazardous) <u>Stop</u> him!'

    Erroneous expression: '*(Kodomo ga kiken na mono ni te wo dasou to shita toki ni) Hayaku <u>yamete</u>!*'

    Correct expression: '*(Kodomo ga kiken na mono ni te wo dasou to shita toki ni) Hayaku <u>tomete</u>!*'

In the equivalent task, 64% respondents answered *tomeru* for the cue word *zu3 zhi3*, 28% provided kanji words including *soshi suru*, *seishi suru* and *boushi suru* and none answered *yameru*. From this result, one can reasonably assume *tomeru* as the most typical translation equivalent for *zu3 zhi3*; and if learners do practise lexical access from the L1 lexicon as claimed by the shared lexicon hypothesis, the mistake rate of 23% cannot be explained.

As discussed earlier, the present study argues that in general, learners only resort to L1 concepts during conceptual formation if it does not contradict the principle of efficiency. In the above case, suppose that learners form the following integrated categories,

- *Tomeru*: 'Stop something (or someone)'
- *Yameru*: 'Stop doing something'

and apart from that, a separate category for *tomeru* adopting the L1 concept *zu3 zhi3*.

- *Tomeru*: '*zu3 zhi3*'

While *zu3 zhi3* means 'stopping someone from doing something' or 'preventing something from happening', it does not include the following usages:

- *Kyoukyuu wo <u>tomeru</u>* (stop a supply)
- *Shigoto no te wo <u>tomeru</u>* (take a break from one's work; Literally: stop one's working hand')
- *Kuruma wo <u>tomeru</u>* (bring a car to a halt)

The similarity in meaning renders the independent category employing the concept *zu3 zhi3* redundant and inefficient, thus learners are unlikely to form such a category. In an integrated knowledge-dominant state, the more salient element 'stop' may be accessed faster than elements that determine whether the discontinuance of an action is caused voluntarily (*yameru*) or imposed (*tomeru*), resulting in the above mistake.

13. Situation (3): '*Zhe4 han4 zi4 zen3 me <u>nian4</u> ?*'

Literally: 'How do you <u>pronounce</u> this kanji?'

Erroneous expression: '*Kono kanji ha nanto <u>hatsuon suru</u>?*'

Correct expression: '*Kono kanji ha nanto <u>yomu</u>?*'

Similar to the previous example, despite the strong linkage between *yomu* ('read') and *nian4* (a response rate of 100% in the equivalent task), the mistake rate of the above usage was as high as 48%. From this it is evident that learners do not access the L1 equivalent, at least for the usage in question. This is because the concept *yomu* is not associated exclusively with *nian4*, but also with *du2* ('read') and *kan4* ('watch') which are all similar in structure.

The integrated categories of *yomu* and *hatsuon suru* are presumably as follows.

- *Yomu*: 'Decipher a word or text'
- *Hatsuon suru*: 'Make the sound of a word (at the larynx)'

The conceptual structure of *yomu* can be further elaborated by more concrete lower categories as follows.

- 'Comprehend words or texts by browsing through them'
- 'Read words or texts aloud'
- 'Pronounce a word (according to its syllables)'

These categories correspond to the following usages.

- '*Kono bunshou wo <u>yonde</u> oite kudasai.*' (Please read the passage beforehand)

- '*Daiichi danraku wo yonde kudasai.*' (Please read the first paragraph aloud)
- '*Kono tango ha yomenai.*' (I can't read this word)

The mistake is believed to be caused by the similarity between 'pronouncing a word (according to its morpheme)' of *yomu* and 'making the sound of a word' of *hatsuon suru*. For instance, if one mispronounces the word 屈服 (/kuppuku/) as /kupuku/, it could be due to a problem with either the former (*yomikata*) or the latter (*hatsuon*), depending on whether the person knows the correct reading of the word 屈服 i.e. /kuppuku/, and whether he is able to pronounce the /pp/ correctly. In either case the situation involves a mispronunciation, thus in order to match the correct expression with the correct situation, learners need to retrieve not only the core element 'pronouncing a word' but also the distinguishing feature, either 'at the larynx' or 'according to the readings'. The discrepancy in internalization between the two elements contributes to difficulty in lemma retrieval, thus giving rise to the high mistake rate. In addition, such mistake is also believed to be biased toward *hatsuon suru* rather than equally distributed across the two words *yomu* and *hatsuon suru*, judging from the speculation that learners are probably more often exposed to comments about their pronunciation (*hatsuon*) compared to remarks about the reading of words. Consequently, learners are likely to produce *hatsuon suru* more easily than *yomu* when it comes to pronunciation-related situations.

14. Situation (14): '*(Da4 re4 tian1 cong2 wai4 bian1 mai3 hui2 lai2 de guo3 zhi1) Xian1 fang4 dao4 bing1 xiang1 li3 deng3 leng3 le zai4 he1.*'

    Literally: '(A bottle of juice just brought home from the store during a boiling summer) Chill the juice before drinking it.'

    Erroneous expression: '*(Manatsu ni soto kara katte kita juusu wo) Reizouko ni irete samete (ori. sameru) kara nomu.*'

    Correct expression: '*(Manatsu ni soto kara katte kita juusu wo) Reizouko ni irete hiete (ori. hieru) kara nomu.*'

Half of the respondents reported on their experience of the above mistake. The most economical means to represent the word *hieru* and *sameru* is arguably by forming the following integrated categories.

- *Hieru*: 'Cool down to a temperature lower than its usual condition'
- *Sameru*: 'Cool down to a less high temperature from a heated condition'

The above structures are relatively abstract compared to those in the previously discussed examples 5-9. While learners may not experience much difficulty in identifying the element "cool down" owing to previously learned concepts in the L1 which involve the drop of temperature (e.g. *bing1*; *liang2*; *leng3*), the process of deciding the exact change of condition may be rather laborious, as it involves relative rather than absolute perception (as with example 5-9). For instance, if a bowl of soup is now at 40˚C, whether one should use *hieru* or *sameru* depends on whether it is chilled (*hieru*) by, say, putting into the refrigerator, or it has become less warm (*sameru*) due to exposure to the ambient temperature. Therefore, instead of having an absolute value that determines which expression to use, it depends on the communicative intention whether the state of 'chilled' or 'less warm' is intended. Consequently, while in example 5-9 difficulty in lemma retrieval only stems from the identification of route (see Figure 24), the abstract nature of the integrated knowledge in the present example may give rise to difficulty in the entire process of lemma retrieval (including both identification of route and generalization), which explains the high mistake rate (50%).

The following example demonstrates similar difficulty entailed in both processes of lemma retrieval, resulting in a mistake rate of as high as 71%.

15. Situation (19): '(*Da3 kai1 hua1 sa3 que4 bei4 lin2 le yi4 shen1 leng3 shui3 shi2*) *Hao3 leng3!*'

    Literally: '(As one turned on the shower and exclaimed) Freezing <u>cold</u>!'

    Erroneous expression: '*Samui!*'

    Correct expression: '*Tsumetai!*'

The most efficient way to represent the word *samui* and *tsumetai* is predicted as follows.

- *Tsumetai*: 'The low temperature of something'
- *Samui*: 'The low temperature felt over the body'

Owing to the explicitness of these structures, the mistake may appear at first glance to arise from the dissociation between the more salient element 'low temperature' and its less salient counterpart that occurs during the identification of route such as in example 5-9. However, a closer inspection by comparing with other usages may lead to a rather different conclusion. For instance, in a situation such as

'*tsumetai nomimono* (a cold drink)' where an object is the intended referential situation, learners may not encounter much difficulty in identifying 'the low temperature of something' as the matching representation. Whereas in situations which lack a target object, such as '*fuyu ha samui* (winter is cold)' or '*kyou ha samui* (today is cold)', learners may easily identify the concept related to *samui* (i.e. that the coldness is 'felt over the body') rather than *tsumetai*. In contrast, in the situation shown in the above mistake, learners are faced with two options, whether to encode the 'cold water' (*tsumetai*) or the 'coldness felt over the body' (*samui*). In order to make the correct decision, i.e. *tsumetai*, learners need to undergo some form of reasoning, for instance that 'it is needless to say that the body feels cold when it is showered with cold water, thus the priority goes to the external stimulus (i.e. the cold water) that brings about the consequence'. The involvement of such inference adds to the abstractness of the above structures, which in turn causes more difficulty in identifying the relevant element. In such cases, learners are inclined to opt for *samui* by default, because in general the sensation of 'cold' is presumably grounded in bodily experience. Integrated knowledge-dominant state prompts learners to resort to their analytical capacity, and the use of reasoning lends support to the argument of the proposed top-down structure.

Other mistakes that are also attributable to the difficulty in both processes of lemma retrieval include the five examples as follows with the mistake rate of 27%, 29%, 32%, 52%, and 65% respectively:

16. Situation (32): '*(Xia4 ban1 hou4 tong2 shi4 yue1 ni3 qu4 chang4 k) Bu4 le, wo3 yao4 hui2 jia1 le .*'

    Literally: '(When invited to karaoke after work) No thanks, I am <u>going</u> home.'

    Erroneous expression: '*Iya, mou ie ni <u>modoru</u>.*'

    Correct expression: '*Iya, mou ie ni <u>kaeru</u>.*'

    - *Kaeru*: 'return to and settle down somewhere'
    - *Modoru*: 'return to somewhere'

17. Situation (40): '*Sui2 shen1 xie2 dai4 fang2 lang2 qi4 yi3 fang2 wan4 yi1.*'

    Literally: 'Always carry a noisemaker in case of emergency.'

Erroneous expression: '*Man'ichi ni <u>mukete</u> (ori.: mukeru) bouhan buuzaa wo itsumo mochiaruiteiru.*'

Correct expression: '*Man'ichi ni <u>sonaete</u> (ori.: sonaeru) bouhan buuzaa wo itsumo mochiaruiteiru.*'

- *Sonaeru*: 'prepare toward something that might happen in the future'
- *Mukeru*: 'prepare toward a specific goal'

18. Situation (5): '*Xiao3 hai2 hen3 <u>tao3 yan4</u> shang4 xue2.*'

Literally: 'My kid <u>hates</u> school.'

Erroneous expression: '*Kodomo ga gakkou ni iku no wo <u>kiratteiru</u> (ori.: kirau).*'

Correct expression: '*Kodomo ga gakkou ni iku no wo <u>iyagatteiru</u> (ori.: iyagaru).*'

- *Iyagaru*: 'show the feeling of dislike or reluctance'
- *Kirau*: 'have the feeling of dislike'

19. Situation (6): '*Fei1 chang2 <u>qi1 dai4</u> hui2 guo2 de ri4 zi.*'

Literally: '<u>Looking forward</u> to my return to homeland.'

Erroneous expression: '*Kikoku no hi wo sugoku <u>kitai shiteiru</u> (ori.: kitai suru).*'

Correct expression: '*Kikoku no hi wo sugoku <u>tanoshimi ni shiteiru</u> (ori.: tanoshimi ni suru).*'

- *Tanoshimi ni suru*: 'look forward to something interesting'
- *Kitai suru*: 'look forward to a desirable outcome'

20. Situation (37): '*Ru2 huo3 ru2 tu2 de zhun3 bei4 zhe hou4 tian1 de bi3 sai4.*'

Literally: 'Preparing hard for the tournament the day after tomorrow.'

Erroneous expression: '*Asatte no shiai ni <u>mukatte</u> (ori.: mukau) isshoukenmei renshuu shite iru.*'

Correct expression: '*Asatte no shiai ni <u>mukete</u> (ori.: mukeru) isshoukenmei renshuu shite iru.*'

- *Mukeru*: 'prepare toward a specific goal'
- *Mukau*: 'move toward a specific direction'

These examples resemble example 5-9 in that the erroneous expression (word) and correct expression (word) share a mutual core element, yet differ from them in

that the new element cannot be represented in an explicit, self-evident way. This implies that the abstract level of these elements only drops bit by bit as more specific instances are stored, since they cannot be adequately encoded via an effective top-down approach as was the case of example 5-9. This explains why these words are more prone to performance mistake compared to example 5-9 [35].

21. Situation (31): '*Bi4 xu1 jun1 heng2 de she4 qu3 ge4 zhong3 ying2 yang3.*'

Literally: 'A balanced intake of various nutrients is essential for health.'

Erroneous expression: '*Ironna eiyouso wo kintou ni toranakucha.*'

Correct expression: '*Ironna eiyouso wo baransu yoku toranakucha.*'

The concept of *kintou ni* and *barasu yoku* are similar in structure if we assume the following integrated knowledge:

- *Baransu yoku*: 'in good proportions'
- *Kintou ni*: 'in the same proportion (i.e. evenly)'

In this event, the core element '(in…) proportion' is likely to be accessed faster than the element that acts as the modifying adjective (i.e. whether 'good' or 'same'), and this explains the occurrence of the above mistake. Meantime, the Chinese word *jun1 heng2* is almost invariably associated with *baransu yoku*, thus the acquisition of the L2 word may also benefit from transfer of the L1 concept, resulting in a more internalized structure.

An4 corresponds to *osu* in some contexts and *osaeru* in the others, thus mistake is generally expected to occur bidirectionally as follows (example 22 and 23).

22. Situation (20): '*Qing3 an4 you4 shang4 fang1 de an4 niu3.*'

Literally: 'Please press the button on the upper right.'

Erroneous expression: '*Migi ue no botan wo osaete* (ori.: *osaeru*) *kudasai.*'

Correct expression: '*Migi ue no botan wo oshite* (ori.: *osu*) *kudasai.*'

23. Situation (1): '*Ke3 yi3 ti4 wo3 ya1/ an4 zhe tui3 ma?*'

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[35] Example 20 has been reported by one of the native speaking participants to be confusing even among native speakers. The mixed input (including erroneous usage produced by L1 speakers) received by L2 learners has possibly contributed greatly to the especially high mistake rate of this example.

Literally: '(In order to practice sit-ups) Can you please <u>hold</u> my legs in place?'

Erroneous expression: '*Ashi wo <u>oshite</u>* (ori.: *osu*) *kureru?*'

Correct expression: '*Ashi wo <u>osaete</u>* (ori.: *osaeru*) *kureru?*'

However, in the equivalent task, 92% of the respondents answered *osu* as the equivalence for *an4* and none answered *osaeru*. The result of performance mistake appears as a close correspondence to this pattern, indicating a mistake rate of 4% for example 22 and 53% for example 23. This seems at first glance to accord with the prediction made by the shared lexicon hypothesis, but such simplistic conclusion may prevent us from some important implications. To begin with, suppose that the following integrated categories were formed.

- *Osu*: 'exert force so as to make something move'
- *Osaeru*: 'exert force so as to prevent something from moving'

The first hint obtained from the mistake rates is that learners most probably access a separate route distinct from the above category for the production of *botan wo osu*. This is because if we assume that the structure of *osu* has been internalized (hence a mistake rate of only 4% in example 22), the high mistake rate of *osu* in example 23 will be contradicted. Based on such rationale, it is predicted that learners access a separate category as follows.

- *Osu*: 'press (*an4*) a button'

Since the context 'press a button' is invariably expressed by the word *osu* (i.e. *botan* always co-occurs with *osu* and not with *osaeru*), the above route serves as a valid and clear-cut category as far as the context of 'press a button' is concerned[36]. In that case, the situation 'press a button' can be encoded as 'exerting force from the fingertip (usually to prevent something from moving)' according to the route of *an4* rather than being understood as 'exerting force so as to make something move'. In other words, there is a considerable possibility that despite being able to use the

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[36] Chunking effect might also play a role in contributing to the internalization of this usage, because the stable combination of these words as well as the frequent encounter in daily lives (when operating any machines such as computers and ATM) may foster the formation of chunk.

expression *botan wo osu* correctly, learners might actually not know that the word *osu* in this situation indicates the motion of 'exerting force in order to send a signal to the machine (generalized as 'the creation of movement')'.

On the other hand, the usage in example 23 is unlikely to form a distinct category as follows.

- *Osaeru*: 'press (*an4*) one's leg'

This is because unlike the case with 'button', 'leg' does not always co-occur with *osaeru*. Consider the inconsistency in the following contexts (all expressible by *an4*).

- *Ashi no tsubo wo <u>osu</u>* (Press the acupuncture points of one's foot)
- *(Ashi wo sashite) Koko wo <u>osu</u> to itai* ([pointing at the leg] It hurts here if I press it)
- *Shukketsu wo tomeru tame ni ashi no kizuguchi wo te de <u>osaeru</u>* (Press the wound on the leg with one's hand to stop the bleeding)

Therefore, learners are more likely to be accessing the main integrated category of *osaeru* concerning the use in example 23. The second implication carried by the mistake rates is that the element 'exert force' is probably more internalized than its counterpart (i.e. 'so as to make something move' or 'so as to prevent something from moving'), causing *osu* to be mistakenly produced.

The intriguing question is that the situation shown in example 23 is indeed encoded in Chinese language in a similar fashion, i.e. 'exert force so as to prevent something from moving' (*an4/ ya1*), and yet learners appear to be experiencing difficulty in identifying the element 'so as to prevent something from moving'. The reason for this is believed to lie in the formation of integrated knowledge (i.e. category), in which the category will be highly internalized if transfer of L1 knowledge is possible. In the case of *osaeru*, however, it is apparent that situations (i.e. referents) that are encoded as 'exert force so as to prevent something from moving' in the Chinese language do not always coincide with those in the Japanese language. Therefore, despite the similarity in certain contexts, the overall inconsistency prevents learners from making use of such previous knowledge. While the element 'exert force' may benefit from full transfer (i.e. both the integrated knowledge and its corresponding contextual knowledge) of L1 knowledge, the range

of referents that belongs to the element 'to make something move' or 'to prevent something from moving' needs to be acquired from scratch. Consequently, the degree of internalization differs between the two elements, leading to potential mistakes in both directions (i.e. mistakenly producing *osaeru* for *osu*, and vice versa). However, in the case of example 22, the separate context-dependent category provides learners with a shortcut for lemma access (i.e. without recourse to the category at a higher abstract level) thus yielding a mistake rate of only 4%.

24. Situation (28): '*Hong2 lv4 deng1 kai1 shi3 <u>shan3</u> le.*'

Literally: 'The (traffic) green light is <u>flashing</u>.'

Erroneous expression: '*Shingou ga <u>hikatteiru</u> (ori.: hikaru).*'

Correct expression: '*Shingou ga <u>tenmetsu shiteiru</u> (ori.: tenmetsu suru).*'

Similar to example 23, the Chinese word *shan3* is indeed structurally closer to *tenmetsu suru* which also carries the element 'emitting light intermittently', yet the mistake rate of this example is as high as 36%. Suppose that the following integrated knowledge has been established in the learners' lexicon for *tenmetsu suru* and *hikaru* respectively.

- *Tenmetsu suru*: '(a device) emit light intermittently'
- *Hikaru*: 'give out light or shine'

While the mutual core element 'giving out light' can be transferred from previously learned concepts such as *shan3* (flash) and *fa1 liang4* (shine), the differentiating element 'intermittently' that distinguishes *tenmetsu suru* from *hikaru* needs to be acquired as its scope of use does not accord with that of *shan3*[37]. Consequently, the more internalized element of 'giving out light' is accessed faster during production leading to the above mistake, although at a significantly lower rate compared to example 23. A plausible explanation for this is that in contrast to the higher difficulty level in internalizing the differentiating elements 'to make something move' or 'to stop something from moving' due to structural similarity, in the case of *tenmetsu suru*, the element 'a device' helps to clarify the conceptual

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[37] The element 'intermittently' contained in the concept of *shan3* can be used to refer to the soft and inconsistent shine of marble floor, diamonds, fur etc. besides the intermittent light emitted by equipments.

content of 'intermittently' and restrict its scope of use (which would otherwise be more ambiguous and take longer time for internalization) thus facilitating differentiation between the two words.

The following example contrasts the results of example 22 and 23 in a comparable way:

25. Situation (8): '*Ni3 hai2 zai4 shui4 o?*'

    Literally: 'Are you <u>still</u> in bed?'

    Erroneous expression: '*Mata neteiru no?*'

    Correct expression: '*Mada neteiru no?*'

Result of the equivalent test shows that 46.2% and 19.2% of the participants answered *mada* and *mata* respectively as the equivalent for *hai2*, reflecting the correspondence between these L1 and L2 pairs. On one hand, *mada* and *mata* accord closely with the Chinese words *hai2* and *you4* respectively in a considerable number of instances and share similar structures as follows:

- *Mada*: 'the persistence of a situation'

- *Mata*: 'the repetition or recurrence of the same event'

On the other hand, there are also a few exceptions in which *hai2* corresponds to *mata* when rendered into Japanese.

- *Ni3 <u>hai2</u> lai2 gan4 shen2 me?* → *Doushite <u>mata</u> kita no?*

- *Jin1 tian1 <u>hai2</u> shi4 yu3 tian1* → *Kyou mo <u>mata</u> ame (no hi) da.*

However, these discrepancies are attributable to the syntactic idiosyncrasies of the Chinese language contexts rather than inherent in the difference in conceptual structure (between *hai2* and *mada*, *you4* and *mata*). The first context refers to the persistence of an undesirable scenario (e.g. 'the visit of one's boyfriend after breaking up'), whereas the second context in which the word *hai2* is bound to the word *shi4* (i.e. 'is') refers to the persistence of the fact that it is still a rainy day.

Such minor incompatibility does not deter learners from transferring conceptual knowledge of *hai2* and *you4* to *mada* and *mata* respectively, resulting in highly internalized conceptual structures. This is evident from the fact that the mistake rate for the above example is as low as 8% (in contrast to the high mistake rate of example 23 despite sharing a similar structure with the L1). At the same time, the L2

conceptual structures remain flexible to accommodate new instances or to eliminate inappropriate instances in a systematic way.

26. Situation (2): '*(Shu1 zhuo1 zhan1 man3 le hui1 chen2) Kuai4 <u>da3 sao3</u> yi2 xia ba*'

    Literally: '(The table is full of dust) Let's <u>clean</u> it <u>up</u>'

    Erroneous expression: '*(Tsukue ga hokori darake de) Hayaku <u>katadukenasai</u>* (ori.: *katadukeru*)'

    Correct expression: '*(Tsukue ga hokori darake de) Hayaku <u>souji shinasai</u>* (ori.: *souji suru*)'

The Japanese words *katadukeru* and *souji suru* are structurally similar to the Chinese words *shou1 shi2* and *da3 sao3*, thus transfer is expected to occur during the acquisition of these L2 words:

- *Souji suru*: 'clean up'
- *Katadukeru*: 'tidy up'

The mistake rate of 35% despite the similarity between these equivalents—including the usage in question—can be attributed to the chunking effect, that is, *tsukue* (table) is more often paired with *katadukeru* (e.g. 'put things in order') rather than *souji suru*. As a consequence, the word *katadukeru* is more likely to be evoked when the situation concerns 'giving the table a clean and tidy look'.

The following examples share a common feature in that the L1 equivalents are typically associated with the incorrect L2 words and not the correct ones. These words are distributed across two big groups: the low occurrence group (0%-13%) and the high occurrence group (38%-78%). The main factor that determines which word goes to which group appears to lie in the prototypicality of the usage in question.

27. Situation (7): '*Wo3 ming2 tian1 qu4 (ni3 jia1) <u>zhao3</u> ni3.*'

    Literally: 'See you (at your place) tomorrow.'

    Erroneous expression: '*Ashita <u>sagashi</u>* (ori.: *sagasu*) *ni iku.*'

    Correct expression: '*Ashita <u>ai</u>* (ori.: *au*) *ni iku.*'

In the equivalent task, all respondents answered *sagasu* as the equivalent for *zhao3* ('find'). Despite the high correspondence between the two words, only one respondent (4%) reported having made such mistake.

The integrated knowledge of *au* and *sagasu* are presumably as follows.

- *Au*: 'meet someone'
- *Sagasu*: 'find someone or something'

Owing to the similarity in structure between *sagasu* and *zhao3*, transfer of the L1 concept *zhao3* is very likely to occur during the formation of the concept *sagasu*. However, the usage shown in the above example is less prototypical among other usages of *zhao3* and is thus likely to be excluded. This is congruent with Kellerman's (1979) argument that L1 transfer generally favors core, prototypical usages to the less prototypical ones. More support is gained from the four examples as follows, with a mistake rate of 0%, 8%, 12%, and 13% respectively.

28. Situation (4): '*Wo3 dei3 zou3 le.*'

    Literally: 'I need to go now.'

    Erroneous expression: '*Mou arukanakucha (ori. aruku).*'

    Correct expression: '*Mou ikanakucha (ori.: iku).*'

29. Situation (9): '*Kai1 kong1 tiao2.*'

    Literally: 'Switch on the air-conditioner.'

    Erroneous expression: '*Eakon wo akeru.*'

    Correct expression: '*Eakon wo tsukeru.*'

30. Situation (39): '*Ta1 bi3 wo3 da4 san1 sui4.*'

    Literally: 'She is three years older than me.'

    Erroneous expression: '*Kanojo ha watashi yori mittsu ookii desu.*'

    Correct expression: '*Kanojo ha watashi yori mittsu toshiue desu.*'

31. Situation (10): '*Ba3 tou2 fa4 liu2 chang2.*'

    Literally: 'Keep one's hair long.'

    Erroneous expression: '*Kami no ke wo nokosu.*'

    Correct expression: '*Kami no ke wo nobasu.*'

The conceptual structures of *aruku*, *akeru*, *ookii*, and *nokosu* can be transferred from *zou3* ('walk'), *kai1* ('open'), *da4* ('big'), and *liu2* ('leave something') respectively. The above usages, however, are rather metaphorical and thus are less likely to be transferred. For instance, *zou3* is most prototypically used to refer to the motion of 'walking' such as *zou3 kuai4 dian3* ('walk faster') and *zou3 bu2 dong4 le* (can't walk anymore). The usage in example 28 indicates 'leaving' rather than the

actual motion of 'walking', thus is considered less prototypical. With regard to the example *kai1*, prototypical usages of *kai1* may include *kai1 men2* (open the door) and *kai1 he2 zi* (open a box) which involves the change of physical state of something from being closed to open. The usage in example 29 indicating the change of state from static to operating is considered a metaphor extended from the core structure of *kai1*. As for example 30, the prototypical usage of *da4* may include *fang2 zi hen3 da4* (a large house) and *da4 dianr3 de xie2* (a larger pair of shoes), which are generally referring to the physical property of something. With regard to example 31, *liu2 le cai2 chan3* (leave a fortune) and *yi2 ge bu4 liu2* (do not leave anything) which indicate 'leaving something without using it up' are more prototypical than *liu2 chang2 tou2 fa4* (keep one's hair) which is based on the metaphor 'keeping the hair without cutting it'. In these cases, although the correct routes might not be easy to acquire due to the drastic difference in encoding between the L1 and the target language, the above mistakes do not occur due to the absence of these usages from the conceptual structure of the incorrect words (i.e. *sagasu*, *akeru*, *ookii*, and *nokosu*). In fact, such absence makes knowledge gap more salient and thus more readily filled by the correct words. This, however, does not necessarily imply the successful establishment of target-like conceptual structures. Rather, learners might encode these usages as context-dependent categories (with less clearly oriented routes. See Section 4.1), until they have accumulated sufficient exemplars to abstract a conceptual representation. For instance, '*eakon wo akeru*' can be encoded as a chunk that represents the situation 'switch on the air-conditioner' without having analyzed the meaning of the word '*tsukeru*'. Similarly, there is considerable possibility of the frequently used phrase "*ai ni iku*" (example 27) forming a chunk which facilitates its correct production.

    32. Situation (29): '*Dou4 fu3 <u>huai4</u> le*'

        Literally: 'The tofu has gone <u>bad</u>.'

        Erroneous expression: '*Toufu ga <u>kowareta</u> (ori.: kowareru)*'

        Correct expression: '*Toufu ga <u>kusatta</u> (ori.: kusaru)*'

This example is highly similar to the above examples in that acquisition of the word *kowareru* can benefit from its L1 counterpart, *huai4* due to similarity in structure.

- *Kowareru*: 'can no longer function anymore'

The mistake rate (24%) is, however, twice as high as those previously discussed (example 28-31) and yet lower than those of the high occurrence group. Unlike the previous examples, *kowareru* and *huai4* share not just prototypical usages such as '*dian4 nao3 huai4 le*' (the computer is broken) and '*xie2 zi huai4 le*' (the shoes are worn) but also non-prototypical usages such as '*qi4 fen1 huai4 le*' (the atmosphere is destroyed) and '*tou2 nao3 huai4 le*' (there is something wrong with one's brain). Owing to the close resemblance between *huai4* and *kowareru*, learners may be misled into the fallacy that the above usage is also transferable from *huai4*, since it conforms well to the structure of *kowareru* when perceived as 'a tofu that has gone bad can no longer perform its function as a food'. This partly explains the occurrence of the above mistake. In addition to this, learners might also experience difficulty in internalizing the correct route of *kusaru*, which is predicted as follows.

- *Kusaru*: 'become rotten'

The acquisition of *kusaru* may benefit from the Chinese word *fu3 lan4* (rotten); however, the broader usage of *kusaru* compared to *kowareru* contributes to the difficulty in internalizing the correct route for the above example.

A similar case is observed in the following example.

33. Situation (36): '*Yan2 se4 hen3 <u>qian3</u>*'

    Literally: 'The color is <u>light</u>.'

    Erroneous expression: '*Iro ga <u>asai</u>*'

    Correct expression: '*Iro ga <u>usui</u>*'

The Chinese word *qian3* and the Japanese word *asai* both share the following structure:

- *Asai*: 'Lack of depth'

The concept of *qian3* can be transferred to the new word *asai*, including prototypical usage such as '*qian3 hai3*' (a shallow sea) and *shang1 kou3 bu4 qian3* (a deep wound) as well as more metaphorical usage such as *jing1 yan4 shang4 qian3* (does not have much experience) and *shui4 mian2 hen3 qian3* (a light sleep). Due to the high transferability of the concept, a longer time would be needed to eliminate the inappropriate usage from the conceptual structure of *asai* and to internalize the correct route according to the following structure.

- *Usui*: 'Lack of thickness'

The concept *usui* can be largely transferred from its Chinese counterpart, *bao2* which shares similar structure. It is worth noting that the concept *asai* and *usui* are rather alike in that both represent some kind of vertical dimension. Therefore, although they might not cause confusion in most cases as do the word pairs in example 5-9 since *asai* and *usui* correspond respectively to two distinct concepts in the Chinese language, learners might encounter certain extent of difficulty in perceiving the tone of colour as a kind of 'thickness' rather than 'depth'.

The high occurrence group consists of the following examples, with a mistake rate of 38%, 40%, 68%, 75%, and 78% respectively.

34. Situation (13): '*Zhe4 ge neng2 xi3 diao4 ma?*'

    Literally: 'Can the stain (on a garment) come off?'

    Erroneous expression: '*Kore ha araeru* (ori.: *arau*)*?*'

    Correct expression: '*Kore ha toreru?*'

35. Situation (16): '*Zhao3 ci2 dian3*'

    Literally: 'Look up (a word) in a dictionary'

    Erroneous expression: '*Jisho de sagasu*'

    Correct expression: '*Jisho wo hiku*' (or '*Jisho de shiraberu*')

36. Situation (33): '*Ta1 bei4 che1 zhuang4 le.*'

    Literally: 'He was knocked down by a car.'

    Erroneous expression: '*Kare ha kuruma ni butsukerareta* (ori.: *butsukeru*).'

    Correct expression: '*Kare ha kuruma ni hanerareta* (ori.: *haneru*) OR *hikareta* (ori.: *hiku*).*'

37. Situation (38): '*Ya1 li4 tai4 da4 diao4 le hen3 duo1 tou2 fa4.*'

    Literally: 'Hair is falling in clumps due to stress.'

    Erroneous expression: '*Kami no ke ga ippai ochita* (ori.: *ochiru*)..*'

    Correct expression: *Kami no ke ga ippai nuketa* (ori.: *nukeru*).

38. Situation (27): '*Xiao3 hai2 xue2 dong1 xi hen3 kuai4.*'

    Literally: 'Children learn new things very fast (children are apt at learning new things).'

    Erroneous expression: '*Kodomo ga atarashii koto wo narau no ga hayai.*'

    Correct expression: '*Kodomo ga atarashii koto wo oboeru no ga hayai.*'

The first question to be answered here is why these mistakes occur at relatively high rates. *Arau*, *sagasu*, *butsukeru*, *ochiru*, and *narau* can be transferred from the L1 concepts *xi3* ('wash'), *zhao3* ('look for'), *zhuang4* ('collide'), *diao4* ('fall'), and *xue2* ('learn') respectively, forming the integrated structures as follows. In terms of prototypicality, all five situations above demonstrate prototypical usage of these L1 concepts, and the high acceptability accounts for why mistakes occur rather easily.

- *Arau*: 'wash something'
- *Sagasu*: 'look for something'
- *Butsukeru*: 'hit against something'
- *Ochiru*: 'fall off'
- *Narau*: 'learn something'

The second question concerns why they occur at varying rates. This can again be explained using the notion of gap-filling. The ease of acquisition (as well as internalization) is governed by the salience of knowledge gap. In example 34, the expression '*Kore ha araeru?*' refers to the situation 'whether the garment is washable (or should be dry-cleaned instead)'. If learners were aware of this, the effect of differentiation would prevent them from making such mistake. The situation 'to remove a stain' constitutes a knowledge gap and thus the matching expression '*toreru*' (or '*ochiru*') will be more readily acquired. In fact, the word '*araeru*' literally means '*neng2 xi3* ('can be' + 'washed')' and not '*neng2 xi3 diao4* ('can be' + 'washed' + 'off (outcome)')' when rendered in learners' L1, thus it is presumably less difficult for learners to realize the inappropriateness of such expression.

In contrast to this, the erroneous expression in example 36 seems more acceptable in the sense that the word *butsukeru* does include the element 'collision', and more importantly, it is not pre-empted by any other referential situation. This agrees with the result of the survey in which the mistake rate for example 36 is much higher compared to that for example 34. In order to correct the mistake, learners need to understand that the concept of *butsukeru* is generally used to express 'crashing something into another static object', and is therefore inappropriate in situations that involve the consequence of 'someone being knocked down' (*haneru*) or 'run over' (*hiku*). Such constraint does not exist in the concept of *zhuang4*

('crashing or collision between two entities'), and needs to be acquired from usages such as '*kuruma wo denchuu ni butsukeru*' (run one's car into an electric pole), '*atama wo kabe ni butsukeru*' (bash one's head against the wall), and '*joushi ni fuman wo butsukeru*' (express one's dissatisfaction to a superior) (Source: Kenkyusha's New Japanese-English Dictionary 5th edition). Therefore, the mistake in example 36 is expected to persist longer than the one in example 34 because modification of the entire conceptual structure (i.e. integrated knowledge) is required to eliminate the incorrect usage. Such difficulty is also evident from the fact that as many as 6 participants reported that they have yet to learn the correct usage.

A similar case is observed in example 35 in which the erroneous expression *sagasu* seems to fit well into the context to express the situation of 'looking up a new word in a dictionary'. The elimination of such misuse requires learners to modify the conceptual structure of *sagasu* in a way that restricts the referents to 'something or someone to be located' and excludes 'information to be searched for'.

Such elimination seems most difficult in example 37 and 38—these usages are not in competition with any other referential situation[38], nor are they incompatible with the conceptual structure of *ochiru* and *narau* respectively. The encoding of the situation 'hair falls' is rather arbitrary in the sense that it has to be encoded as 'something initially attached to another thing becomes detached' rather than 'falling from a higher position to a lower one' without a compelling reason, as far as conceptual structure is concerned. This is to say that there is no effective way to inhibit the production of the incorrect word other than internalizing the route of the

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[38] With regard to example 37, '*kami no ke ga ochiru*' can be used to refer to situations in which the hair is found somewhere, that is when the perspective shifts from 'the detachment of the hair from the scalp' to the phenomenon of 'falling off from a higher position (i.e. the head)'. However, such distinction is not only subtle (in the sense that the distinction is based merely on difference in perspective rather than being used to express different meanings, as with example 34. In other words, the incorrect use will be simply inappropriate but will not lead to a different interpretation of meaning) but is also considered arbitrary as it is not observed in other languages such as English and Chinese.

correct word. With regard to example 38, learners need to understand that the situation has to be encoded in terms of the 'outcome of learning' (*oboeru*) instead of the 'process of learning' (*narau*) according to the norm in the Japanese language. The high acceptability makes it more difficult to eliminate such incorrect use. Consequently, competition between the incorrect route (*ochiru* and *narau*) and the correct route (*nukeru* and *oboeru*) manifests itself in the form of performance mistake which will persist until the correct route becomes internalized.

Having answered how these mistakes occur, the remaining question is then how learners gain access to the correct words, and why at a lower success rate than the incorrect words. The first possible structures of integrated knowledge of the five lexical items in example 34-38 are as follows.

- *Toreru*: 'manage to remove'
- *Hiku*: 'draw something near to one'
- *Haneru*: 'send something or someone flying'
- *Nukeru*: '(something which is supposed to be attached to another) becomes detached'
- *Oboeru*: 'learn and (as a result) remember something'

All of these structures need to be formed from scratch[39] (except for *oboeru*) and the perspectives encoded (i.e. routes) are clearly different from those in the L1 expressions. Therefore, the progress of internalization of these words is predicted to be slower than that of the incorrect words, of which conceptual structures are formed via L1 transfer. In the case of *oboeru*, the integrated knowledge can be transferred from the L1 concept *ji4*; however, the word *oboeru* is used in a broader sense compared to *ji4*, thus the novel referents may be less internalized than those transferred from the L1.

Apart from such integrated categories, consider the following context-dependent categories adopting the L1 route:

- *Toreru*: '<u>xi3 diao4</u> (be cleaned off)'

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[39] Since there is no previously learned concept in the L1 available for transfer, learners need to acquire the contextual knowledge (i.e. scope of referents) from scratch and form a novel category from the instances stored.

- *Hiku*: '<u>zhao3</u> ci2 dian3 (look up a dictionary)'
- *Haneru*: 'che1 <u>zhuang4</u> dao4 ren2 (car hits someone)'
- *Nukeru*: '<u>diao4</u> tou2 fa4 (hair falls)'

There is a high possibility of these categories being formed due to the following reasons. First, the integrated structures of these words might not have been established yet at the point of time learners come across the above usages. Even if learners do possess some knowledge about these concepts, the categories might not have undergone adequate internalization. As a consequence, learners are inclined to establish a more easily accessible context-dependent category than to risk impairing performance accuracy by accessing a highly abstract conceptual structure. Second, the clear-cutness of these context-dependent routes allows efficient storage and accurate use. A sharp contrast to this is found in example 1, in which the route adopting an L1 equivalent corresponds to multiple L2 words in similar contexts, thus is less favorable in terms of economy of storage.

While being valid conceptual structures in their own rights, these routes are not without problem when it comes to production. Since these categories are not compatible with the larger integrated categories, they cannot benefit from the automaticity (in terms of both lemma retrieval as well as phonological encoding) developed in the larger categories. Therefore, unless being strengthened by frequent retrieval, the form-meaning link of these independent categories may be relatively weak compared to the more consolidated structures of *arau* ('wash'), *sagasu* ('find'), *butsukeru* ('collide'), and *ochiru* ('fall'). These factors together contribute to the high probability of these incorrect words being retrieved, resulting in the high mistake rates.

In brief, the high mistake rates carry two important implications. First, knowing the correct use of a word (in a particular situation) does not equate to possessing target-like conceptual knowledge. Second, although knowing the correct word supposedly implies the rejection of the incorrect expression, this does not seem to be the case as far as conceptual structure (as opposed to the superficial knowledge concerning what is the correct or incorrect use) is concerned. It is not difficult to imagine a learner being taught or having learned that word A instead of word B should be used in a particular situation, but not knowing why. Consequently, the

incorrect use is not effectively eliminated from the conceptual structure and ends up competing with the correct word during retrieval. This also explains why some participants reported that they thought the correct word and incorrect word are both valid usage.

The following example further demonstrates the central role played by the economy principle.

39. Situation (35): '*(Yi4 ting1 jian4 ta1 you3 shi4) Ta1 jiu4 ma3 shang4 pao3 lai2 le*'

Literally: '(Hearing that she was hurt) He rushed to her straight away'

Erroneous expression: '*(Kanojo ga kega shita to kiite) Kare ha sugu ni hashitte* (ori.: *hashiru*) *kita*'

Correct expression: '*(Kanojo ga kega shita to kiite) Kare ha sugu ni kaketsukete* (ori.: *kaketsukeru*) *kita*' OR '*Kare ha sugu ni tonde* (ori.: *tobu*) *kita*'

In this example, owing to the structurally similar equivalents in the Chinese language *pao3* ('run') and *fei1* ('fly'), the words *hashiru* and *tobu* are most probably acquired by means of transfer of these previously learned concepts.

- *Tobu*: 'fly'
- *Hashiru*: 'run'

According to the hypothesis made in the present model, the above usage is unlikely to be transferred due to its lack of prototypicality (since it does not refer to the physical movement of 'running'), yet the mistake rate was as high as 74%. A plausible explanation is that in contrast to example 28-31 in which the gap can be readily filled by a newly acquired word (hence low mistake rate), in the present example the usage needs to be incorporated into an already established conceptual structure (i.e. '*tobu*'). This is because according to the economy principle, the establishment of a separate context-dependent category is only desirable in cases where the integrated category is not yet fully accessible (e.g. '*tsukeru*', '*nobasu*', '*toreru*', '*haneru*', '*nukeru*'), or where learners find it difficult to incorporate the usage in question into the integrated category (due to difficulty in identifying the commonalities shared between the target and the standard). In the case of example 38, considering that the integrated category of '*tobu*' is readily established and that it

can categorize the new target (i.e. the usage in question) with comparative ease, the usage is more likely to be encoded in a new route which conforms to the structure of *tobu*, instead of being registered under a separate category with a context-dependent route (e.g. example 28-31, 34-37). The access to such integrated category is more laborious than accessing the more context-dependent categories available in example 28-31. On the other hand, the alternative, *kaketsukeru*, is usually only learned at a later stage of acquisition and is thus less internalized, apart from its longer syllabus that aggravates the difficulty of production. As a result, the knowledge gap is prone to be filled by the handiest candidate, i.e. *hashiru*, giving rise to the high mistake rate.

This example lends additional support to the assumption that context-dependent categories are more easily accessible, and that such routes are formed only in cases where the integrated category of the correct route is yet to be established and internalized. The especially high mistake rates in example 38 and 39 also corroborated the argument made in Section 4.3.1 that when there is no obvious communication gap (since the words *tobu* and *oboeru* are already acquired), learners will be discouraged to notice the input and thus internalization tends to progress slower. Such phenomenon is congruent with the principle of economy, where the efficiency of information processing is enhanced by focusing attentional resources on new rather than old information.

40. Situation (12): '*De2 dao4 le hen3 bu2 cuo4 de fen1 shu4*'

    Literally: 'Scored well (in an examination)'

    Erroneous expression: '*Ii tensuu wo moratta* (ori.: *morau*)'

    Correct expression: '*Ii tensuu ga toreta* (ori.: *toreru*)'

The last example demonstrates how internalization can be affected by learner's cognitive ability apart from transfer of L1 knowledge. The integrated structures of *toreru* and *morau* are predicted as follows.

- *Toreru*: 'manage to take or get'
- *Morau*: 'receive from someone'

As far as the above situation is concerned, both routes may seem at first glance to be equally easily accessible owing to the similar route in learners' L1, such as *de2 dao4* (similar to *morau*), *huo4 de2* (similar to *morau*), *qu3 de2* (similar to *toreru*),

and *na2 dao4* (similar to *toreru*) which are all valid expressions for the above situation. However, a closer examination of the above structures will reveal a significant difference between the two concepts: while the word *morau* is relatively transparent in its scope of referents, the word *toreru*, by contrast, requires the scope of use to be acquired from scratch (i.e. cannot be derived from an explicit description). In other words, the top down approach greatly fosters the acquisition and internalization of *morau* but is not applicable in the case of *toreru*. Consequently, *morau* is more easily retrieved than *toreru*, until the latter also becomes equally internalized.

5.6 Conclusion of the questionnaire survey

The performance mistakes reported by advanced learners of Japanese language provide strong evidence in support of the models of acquisition and internalization proposed in the present study. The occurrence of mistakes reflects the top-down developmental pattern (i.e. integrated knowledge-dominant structure) of L2 learners. Some mistakes arise from inadequacy of competence while others inadequacy of automaticity. With regard to the lack of competence, it is evident that knowing the correct expression does not equate with possessing target-like conceptual representation (see especially '*botan wo osu*', '*kuruma ni hanerareru*', '*kami no ke ga nukeru*', '*eakon wo tsukeru*'), and also that differentiation may not be adequate as the inappropriate usage has yet to be eliminated from the structure (of the incorrect word). The study also revealed the loose conceptual structures (see Figure 21a-c) of the learners, because they often need to make drastic inference to retrieve the correct concept, indicating a weak contextual representation (see, e.g., example of '*hieru*'). In addition, evidence that indicates the use of top-down approach was obtained from the example '*tsumetai*' (see also example of '*yomu*' and '*oboeru*'), in which the use of the word in the given situation is no different from other usages such as '*tsumetai nomimono*' for native speakers of Japanese, yet appears to be significantly more difficult for L2 learners. This supports the claim made in Section 4.3.1 that in an integrated knowledge-dominant state, the prototype is not formed from the accumulation of instances, but is rather assumed based on inference and L1 knowledge. As a means to cope with such loose structure, these advanced learners

were found to resort to context-dependent category where possible to ensure accuracy and ease of access (e.g. '*botan wo osu*', '*eakon wo tsukeru*').

With regard to the lack of automaticity, the findings confirm the existence of two distinctive steps, namely selective encoding and generalization (Figure 16), in the formation of integrated knowledge posited in the present thesis. These two processes correspond to 'identification of elements (route)' and 'generalization' respectively during lemma retrieval (Figure 24). The notion of internalization discussed in this study can be conceived as the effort required to perform these two operations which can be observed from the different patterns of performance mistake. First, L2 words such as '*kasu*', '*oto*', '*yameru*', '*nioi*', and '*kiru*' are low in abstractness and thus learners are unlikely to experience much difficulty in generalizing the relevant elements (i.e. the 'generalization' stage). The only plausible explanation for the occurrence of these performance mistakes (an average of 20%-30% except for '*kiru*') is that longer processing time is required to identify the elements that are newly encoded (compared to the counterparts which are transferred from the L1) during production due to inadequate internalization. Concepts or usages that are more abstract, on the other hand, cause difficulty in both processes of identification of route and generalization (see, e.g., '*osaeru*', '*mukeru*', '*nukeru*'). Consequently, performance mistake occurs at a higher rate compared to words that are less abstract and representable in a highly explicit form. In either case, it is important to note that involuntary performance mistakes only happen when the conceptual structure is not fully internalized (i.e. weak contextual support). Internalized routes or elements are accessed faster during production, giving rise to performance mistake. Thus the pattern of mistake can indeed be extremely informative about learner's conceptual structure.

Gap-filling proves to be a reliable predictor of the ease of acquisition and internalization. According to the findings of the present study, a word or usage is more readily acquired (and internalized) when the perceived gap is salient due to any of the following reasons:

- When a usage has been rejected from the structure of the incorrect word due to low prototypicality (compare '*sagasu*', '*akeru*', '*ookii*', '*nokosu*' with '*butsukeru*', '*ochiru*', '*narau*').

- When a usage has been eliminated from the structure of the incorrect word due to structural incompatibility (see examples of '*motsu*', '*butsukeru*').

- When the incorrect word has already been used as a label for another referential situation (see especially example of '*arau*').

- When a difference is perceived between the target word and the incorrect word. The process of differentiation (often by extraction of more fine-grained elements) is a gradual one, and the core elements tend to be acquired and internalized more easily due to salience of knowledge gap.

In brief, the acquisition status of related words (i.e. interlexical relationship) has a significant influence on the perceived salience and consequently the ease of acquisition of a particular word. A gap can be salient and readily filled if the usage is encountered repeatedly (i.e. memory-oriented approach triggered by external stimulus), or made salient by actively engaging in differentiation (i.e. analytical approach triggered by internal stimulus) with the aid of cognitive ability. For instance, learners may ask themselves questions such as "why is this word used in this situation", "why is word A instead of word B used". This helps to facilitate noticing of gap and allows words to be retrieved more easily. Vocabulary knowledge acquired by means of reasoning needs to be practiced frequently (by strengthening contextual representation) to enable spontaneous retrieval, because the reliance on analytical approach during production could slow down the speed of access[40]. With increasing encounter and intake of exemplars, the commonalities of these instances are gradually reinforced and thus access becomes more direct and

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[40] A similar example can be observed in the retention of form-meaning linkage. For instance, if a learner finds the word '(*denshi*) *renji*' (microwave oven) and '*reji*' (cashier) confusing due to phonological similarity, he may differentiate the two words using keyword strategy (i.e. analytical approach), such as '*renji ga renga no ue ni okareteiru*' ('the oven is put on top of the brick'). Such technique is helpful in differentiating the two words, but may cost a longer processing time. With repeated practice, the connection between word form and meaning in respective pairs is forged, and the keyword technique is no longer required.

rapid. Therefore, mistakes can be said to arise largely from the cognitive maturity of these adult L2 learners.

Apart from various analytical skills, L1 knowledge serves as another important resource to assist gap-filling. Transfer of L1 knowledge can occur at either contextual level or integrated knowledge level. In the case of the former, as the transferred routes (that follow the encoding of the L1) may be incompatible with the integrated category, the issue of storage efficiency may arise if such route exists in excess. For this reason, transfer is subject to the principle of economy, and concepts or usages that are prone to this kind of transfer often contain the following features (compare examples of '*motsu*', '*oku*', '*yameru*', '*osu*', '*hashiru*' with '*arau*', '*butsukeru*', '*ochiru*'):

- Has a route that is clearly distinct from that encoded in the L1 (thus making acquisition and internalization of the correct route difficult).

- The integrated category is usually a novel structure (as opposed to one that is transferred) that is relatively abstract and is yet to be internalized (thus learners are motivated to create a "short-cut", i.e. the route transferred from the L1, to ease retrieval).

- Can be represented by a clear-cut route that is distinct from other usages of the same word (thus the formation of an individual category employing the L1 route is favourable).

The transfer of L1 routes provides a means of fluent access during lexical retrieval (but not phonological encoding). As demonstrated in the present study, getting familiarized with a new route could be a laborious process and until the route is internalized, learners may not be able to access it spontaneously. Therefore, a conceptual structure that is regarded as the ideal model from the viewpoint of cognitive linguistics may not always be the best for learners when fluency is concerned.

On the other hand, transfer that takes place at the integrated knowledge level is subject to the prototypicality of the usage in question (compare '*sagasu*', '*akeru*', '*ookii*', '*nokosu*' with '*arau*', '*butsukeru*', '*ochiru*', '*narau*'). This type of transfer allows L2 concepts to be acquired and internalized efficiently, especially when a large portion of L1 referents coincide with those of the L2 (compare *mada* with

osaeru). Results also showed that elements that are transferred are significantly more internalized than the non-transferred elements, leading to discrepancy in access rate which may persist for a considerable long time. Such evidence corroborates the following claims made in the present model: 1) that previously learned knowledge can be transferred not just in the form of whole concept but as well as in the form of element to yield maximum efficiency. The transfer of element is a matter of internal structure and does not necessarily bear any relevance to the equivalence relationship between L1 and L2 (as suggested by Pavlenko) (compare *hazu* with *oto*); 2) that transferred elements are much more internalized that the non-transferred elements, and thus are accessed more rapidly during production.

In summary, various constructs that comprise a conceptual structure—including integrated categories, the less abstract context-dependent categories which are either compatible or incompatible with the higher level categories—are neither random nor fixed outcome of concept formation, but are rather products of competition among the three components, namely structural efficiency (coverage of scope, number of categories), automaticity (i.e. access fluency), and accuracy. The present study suggests that the conceptual structure formed at any stage of acquisition represents the equilibrium among all these components, of which the dynamic depends on the resource available to the learner at that particular point of time. The approach adopted in this survey is in sharp contrast with the conventional method used in the field of error analysis, as it allows us to identify the process that is responsible for erroneous production, thereby offering useful hints on how to prevent or overcome the problem. What will be most useful for learners is not a detailed description or classification of the mistakes they make, but the procedures that would assist them toward acquiring as much conceptual knowledge as possible with the least cost in terms of effort and time.

6. Conclusion and implications

The current work is motivated by the urge to fill a gap in the literature of SLVA research, that is the long-standing and as yet unanswered question as to how L2 learners acquire target-like competence. The mainstream approach to the study of vocabulary acquisition has been largely descriptive, and there are very few examples of explanatory, model-based research which attempts to illuminate the underlying cognitive processes that are responsible for the phenomena being studied. The present study has addressed this issue by proposing a fundamental and theoretical framework for the acquisition of conceptual knowledge. In the model put forth here, usage-based theories have been adapted for the study of L2 acquisition and carefully modified by taking into consideration the dissimilarity between L1 and L2 acquisition.

The goal of SLVA is viewed as comprising of three components, namely accuracy, efficiency, and fluency. Efficiency underscores a major characteristic of L2 acquisition, which is attainable by virtue of the cognitive ability of adult L2 learners. The second dimension, i.e. automaticity or fluency of access, is equally important because acquisition is never complete until the access of knowledge becomes fully routinized (a process termed as internalization in this thesis). The present work has posited a set of cognitive mechanisms[41] that account for how learners develop L2 competence characterized by these three features, besides explicating the roles played by previously learned knowledge (including L1 concepts) and learner's analytical ability.

Chapter 1 provided an overview of the problems in the prevalent view of studies related to L2 acquisition. It also clarified the pertinence of the three above-mentioned components to acquisition.

Chapter 2 reviewed the literature of three main streams of studies. The first of these is the study of bilingual mental lexicon that places its focus on the lexical representation and development of bilingual lexicon. While these studies have

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[41] In the present study, the focus has been on the representation of lexical units, but the same set of mechanism is also applicable to the acquisition of morphological units.

contributed significantly to the understanding of the access of lexical information, when applied in the study of acquisition the models developed in this field can be said to be theoretically flawed, as they cannot account for the three components above. In contrast to this, usage-based theories offer a range of theoretical concepts that may also apply to L2 acquisition. The potential and limitation of usage-based models were reviewed in the second part. Last but not least, the third part relates to studies of automaticity conducted in the field of skill acquisition. The central issue is how such research could contribute to the study of L2 fluency, and how the three main branches of approach, namely the rule-based theory, the item-based theory, and the chunking theory, can be reconciled.

Chapter 3 explored the mechanisms by which learners develop contextual knowledge, which is the basis that forms a target-like conceptual structure. The notion 'specificity' was proposed as the essential factor that governs the accuracy of gap-filling. Building on the theoretical grounding established by Tomasello, the chapter elucidated the cognitive process (i.e. instantiation) of the formation of contextual knowledge and demonstrated the effect of various factors including contextual condition, L1 knowledge, and intra- as well as inter-lexical aid.

Chapter 4 discussed how learners develop complete conceptual knowledge in the unit of category (i.e. integrated knowledge) based on the contextual knowledge described in Chapter 3. Drawing on the fundamental concept of usage-based theory, the study proposed a process consisting of two steps in which L1 knowledge exhibits different functions. The notion of internalization, that is the cognitive process responsible for the development of automaticity, was derived from the bi-layer conceptual structure (comprising of contextual knowledge and integrated knowledge) and the progress of which was illustrated via simulation. The model is also able to account for the process of chunking, and indicates a convergence with connectionist models at later stages of acquisition.

The hypotheses made in Chapter 4 were tested using performance mistakes produced by Chinese speaking advanced L2 learners of Japanese as reported in Chapter 5. The findings have confirmed the following: 1) that the progress of competence and automaticity is inextricably linked to each another; 2) that the so-called L1 equivalent is least preferred (or deliberately avoided); rather, L1

knowledge plays a much more active and robust role during acquisition; 3) that integrated knowledge is formed via two distinct steps; and 4) the interplay of economy principle, ease of access (i.e. automaticity), and accuracy, in the process of acquisition. In brief, the theoretical accounts put forth in the present work have been largely borne out by the data obtained from the questionnaire survey.

The model proved to be congruent with the views of usage-based theories, especially concerning the fact that contextual strength plays a central role in fostering the development of competence and automaticity. Nevertheless, the present model differs from the usage-based models in many ways, one of them being the efficiency of learning brought forth by L1 knowledge. In this model, the use of L1 concepts is by no means mandatory as claimed by theories of shared lexicon; rather, the present study suggested that such previously acquired knowledge serves an additional resource to aid learning. A systematic account of the role of L1 has been made within the framework of acquisition consisting of the process of instantiation, selective encoding, and generalization[42].

Such view of acquisition allows the utilization of L1 concepts to be accounted for without impairing the integrity and coherence of the conceptual structure, at the same time maximizing the usefulness of L1 knowledge. Apart from playing an active role in the formation of a novel L2 conceptual structure, L1 concepts could also exist in the L2 lexicon in the form of an association with frequently co-activated L2 words. To put it shortly, the knowledge structure of L2 learners is more appropriately perceived as a complicated yet well-organized network that is sensitive to various forms of input and is flexible enough to incorporate the dynamic changes brought about by the cognitive processing of these inputs.

The theoretical framework established in the present work can be applied in various areas of L2 learning and teaching. The notion of equilibrium, for instance, may serve as a guideline to help learners take better control of their vocabulary learning and plan effective learning strategy according to the goal and resource (time, the type and amount of input available). If one needs to acquire L2 competence to a

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[42] L1 may also play an important role in constructing the preverbal message, i.e. helping to organize the mind, but is not discussed in the present work.

level that enables him to function adequately in various communicative situations both receptively and productively within a relatively short period, the most efficient method would be the conventional word list learning as it allows a considerable number of words to be retained easily and produced with relative ease, though at the cost of accuracy. Engagement in a more analytical processing by inferring the meaning of words from their contexts (i.e. the process of instantiation) and forming one's own image schema may help learners to grasp meaning more precisely, but production might be less fluent until the conceptual structure becomes internalized. Learning strategy needs to be revised from time to time according to the stage of acquisition, as was suggested by the notion of gap-filling.

The study also sheds light on research topics related to learning difficulty and order of acquisition, as well as the effect of interlexical relationship on acquisition. Predictions can be made based on the processes of instantiation, generalization, and internalization outlined in the present study. The outcome of such analysis can, in turn, be applied to the design of syllabus, teaching material, and graded proficiency test.

Future work includes further refinement and optimization of the current model, by working out a set of conditions that would most efficiently foster instantiation, generalization, and internalization. This includes, for instance, the frequency and type of input, and the sequence and span in which the input is presented to the learner. In addition, the validity of the model should be further verified by conducting similar study with different languages. The model can also be utilized in the study of acquisition of other areas particularly grammatical aspects of L2.

In conclusion, the present study has attempted to illuminate the big picture of L2 vocabulary acquisition, and the development of such formal model is believed to contribute to the understanding of the mechanisms that underlie the success (or failure) of L2 acquisition. It is significant not only because it leads us to shift from the investigation of fragmentary and disconnected episodes to the exploration of the whole, but also because the theoretical underpinning could serve as a basis for various pedagogical applications.

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Appendix 1: Benchmark test

番号	使用場面	正解	問題ない	違和感	おかしい
1	（腹筋運動をするために）「足を＿＿＿＿くれる？」 →押さえる　　X押す 備注：				
2	（机にほこりがいっぱい積もったため） 「早く＿＿＿＿なさい。」 →掃除する　　X片付ける 備注：				
3	（例えば「矛伴目途」など読めない漢字を見たときに） 「この漢字は何と＿＿＿？」 →読む　　X発音する 備注：				
4	（友達の家に遊びに行っていてそろそろ夜１０時になった） 「もう＿＿なくちゃ。」 →行く　　X歩く 備注：				
5	（子供がいつも「学校に行きたくない」とわめく） 「子供が学校に行くのを＿＿。」 →嫌がる　　X嫌う 備注：				
6	（海外で長くいていて久しぶりに国に帰ることになったとき） 「帰国の日をすごく期待している。」 →楽しみにする 備注：				
7	（長い間あっていないので） 「明日＿＿に行く。」 →会う　　X探す 備注：				
8	（もうすぐ昼一時） 「＿＿＿寝ているの？」 →まだ　　Xまた 備注：				
9	（暑いから） 「エアコンを＿＿」 →つける　　　X開ける				

	備注：				
10	（髪の毛がすでに十分長い人に対して） 「髪の毛をどこまで＿＿＿＿つもり？」 →伸ばす　　X残す 備注：				
11	（友達と宝塚の話をしていたら） 「今度私を<u>持って</u>いってください。」 →連れる　　X持つ 備注：				
12	（先学期履修した科目で） 「いい点数・成績を＿＿＿＿。」 →取る　　　Xもらう 備注：				
13	（カレーがこぼれた洋服をクリーニング屋さんに持っていって） 「これは＿＿＿＿？」 →取れる　　X洗える 備注：				
14	（真夏に外から買ってきたジュースをしばらく冷蔵庫に入れて） 「＿＿＿＿から飲もう。」 →ひえる　　Xさめる 備注：				
15	（読みたい本を） 「友達から＿＿＿＿。」 →借りる　　X貸す 備注：				
16	（難しい単語に遭遇したときに） 「辞書を＿＿＿。」 →引く　　　X探す 備注：				
17	（天気がおかしくてもう六月だというのに急に） 「雹が＿＿＿＿きた。」 →降る　　X降りる 備注：				
18	（友達がちょっとまずいことをしたためそれを指摘しようとして） 「そんなことをする＿＿＿じゃないよ。」 →べき　　　Xはず 備注：				
19	（真冬にシャワーしようとして水を出したとたん） 「うぁ〜＿＿＿！」 →冷たい　　X寒い 備注：				

20	（機械を操作しているときに） 「右上のボタンを＿＿ください。」 →押す　　X押さえる 備注：				
21	（アイスを一口食べて） 「バニラの<u>におい</u>がするね。」 →あじ 備注：				
22	（風呂上りで髪の毛がまだぬれている） 「髪の毛がもう少し＿＿＿から寝よう。」 →乾く・乾かす　　X乾燥する 備注：				
23	（友達とおしゃべりで盛り上がっていて） 「<u>よだれ</u>を飛ばしてしゃべる。」 →つば 備注：				
24	（冷たい飲み物が嫌いなのでレストランに行ってコーヒーを頼むときに） 「氷を＿＿＿ないでください。」 →入れる　　X置く 備注：				
25	「ズボンを＿＿。」 →履く　　　X着る 備注：				
26	（しゃべるときに） 「<u>音</u>が大きい。」 →声 備注：				
27	「子供が新しいことを＿＿＿のが早い。」 →覚える　　　X習う 備注：				
28	（道を渡ろうとしたときに） 「青信号が＿＿＿から早く渡ろう」 →点滅する/もうすぐ変わる　　X光る 備注：				
29	（夏場に入ると冷蔵庫の調子が悪いから、買ったばかりの） 「豆腐がすぐ＿＿。」 →痛む/腐る　　X壊れる 備注：				
30	（子供が危険な薬品を手に入れようとしたときに子供の母親に対して） 「はやく＿＿＿！」 →とめる　　Xやめる				

	備考：				
31	（たんぱく質、炭水化物、ビタミンなど） 「いろんな栄養素を＿＿＿摂らなくちゃ。」 ➔まんべんなく/バランスよく　　X均等に 備考：				
32	（会社が引けた同僚にカラオケに誘われて） 「いや、もう家に＿＿＿。」 ➔帰る　　X戻る 備考：				
33	「彼は昨日仕事の帰りに車に＿＿＿今入院している。」 ➔はねられる/ひかれる　　Xぶつける 備考：				
34	「明日パソコンを使うから必ず＿＿＿きてください。」 ➔持つ　　X連れる 備考：				
35	（彼女が怪我したと聞いて） 「彼はすぐ＿＿＿きた。」 ➔駆けつける/とぶ　　X走る 備考：				
36	（色のトーンの中で） 「色が＿＿＿。」 ➔薄い　　X浅い 備考：				
37	「明後日の試合に＿＿＿一生懸命練習している。」 ➔向けて　　X向かう 備考：				
38	「ストレスで髪の毛がいっぱい＿＿＿」 ➔抜ける　　X落ちる 備考：				
39	（私は30歳で友達は33歳） 「彼女は私より三つ＿＿＿＿。」 ➔上/年上　　X大きい 備考：				
40	「万一に向けて防犯ブザーをいつも持ち歩いている。」 ➔備えて 備考：				
41	情況：「（早上五点太阳照进来时）醒过一次，后来又睡着了。」 「夏場は夜明けが早いので、日差しが差し込んできて（まぶしくて）五時過ぎに一度＿＿＿が、それからまた眠ってしまった。」				

	→目が覚める　　X起きる 备注：				

→目が覚める　　X起きる
备注：

Appendix 2: Questionnaire

调查问卷

个人资料（所有个人资料将绝对保密）

姓名：_____　　在日年数（总）：_____年　　国籍：_____

母语：_____日语学习（包括使用）　　年数：_____ 年

日语检定 1 级文凭有无：_____

PART 1

指示：请将您想到的**第一个**日语单词填上。

No.	中国語単語	日本語対訳	No.	中国語単語	日本語対訳
1	压（动词）		20	按（动词）	
2	打扫（动词）		21	味道	
3	念		22	干（形容词）	
4	走		23	口水	
5	讨厌		24	放	
6	期待（动词）		25	穿	
7	找		26	声音	
8	还(hai)		27	学	
9	开		28	闪	
10	留		29	坏了（动词）	
11	带（动词）		30	阻止	
12	得到		31	均衡	
13	洗		32	回	
14	凉了		33	撞	
15	借		34	跑	
16	下（动词）		35	浅	
17	醒		36	掉	
18	应该		37	大	
19	冷		38		

PART 2

1. 该问卷的目的在于收集"**明知误犯**"型的口误，即日语学习者<u>在知道正确说法的情况下（即当时自己有能力即刻纠正的错误）</u>不小心犯的口误。请尽量据实作答，如非常不确定的话请选择"不确定"。

2. 提示的情况或用法纯属例子（**范围不局限于此**），重点在于该（划了线的）单词及其对应单词的错误使用，包括双向的错误。比如「借りる」说成「貸す」或者「貸す」说成「借りる」都在范围之内。

3. 如有任何具体口误例子（比如在特定情况下曾经犯过的口误），或类似的口误（比如你曾经在类似情况下使用另一种错误说法）等等，都请写在"**备注**"一栏里（除了有关自动词和他动词的错误）。唯一条件请参照（1）。

排列	情况 该单词（划线）的错误用法 →正确说法 备注： （请在每一道选择一个答复，并打上 X 号）例子：	你是否曾经在知道正确说法的情况下犯过这项口误？					
		有	应该有	不确定	应该没有	没有	本来就不知道正确说法
			X				
1	情况：「（做仰卧起伏时）可以替我压着腿吗？」 「足を<u>押して</u>くれる？」 →押さえる 备注：						
2	情况：「（书桌沾满了灰尘）快打扫一下吧。」 「早く<u>片付け</u>なさい。」 →掃除する 备注：						
3	情况：「这汉字怎么念？」 「この漢字は何と<u>発音する</u>？」 →読む 备注：						
4	情况：「（已经不早了）「我得走了。」						

	「もう<u>歩か</u>なくちゃ。」 →行く 備注：					
5	情况：「（每天嚷着不要上学发脾气）小孩很讨厌上学。」 「子供が学校に行くのを<u>嫌っている</u>。」 →嫌がる 備注：					
6	情况：「非常期待回国的日子。」 「帰国の日をすごく<u>期待している</u>。」 →楽しみにする 備注：					
7	情况：「明天去（你家）找你。」 「明日<u>探し</u>に行く。」 →会う 備注：					
8	情况：「（都快中午一点了）你还在睡哦？」 「また<u>寝ている</u>の？」 →まだ 備注：					
9	情况：「开空调。」 「エアコンを<u>開ける</u>」 →つける 備注：					
10	情况：「你打算把头发留到多长？」 「髪の毛をどこまで<u>残す</u>つもり？」 →伸ばす 備注：					
11	情况：「（我也想去）带我去。」 「私を<u>持って</u>いってください。」 →連れる 備注：					
12	情况：「（某科目）得到了很不错的成绩或分数。」 「いい点数・成績を<u>もらった</u>。」 →取る 備注：					
13	情况：「（衣服沾了咖喱汁）这个能洗掉吗？」 「これは<u>洗える</u>？」 →取れる/落ちる 備注：					

14	情况：「（大热天刚从外边买回来的果汁先放到冰箱里）等凉了再喝。」 「<u>さめて</u>から飲む。」 →ひえる 备注：						
15	情况：「（向某人）借了一本书。」 「本を<u>貸した</u>。」 →借りる 备注：						
16	情况：「（遇到不懂的生词时）找词典。」 「辞書で<u>探す</u>。」 →調べる・（辞書を）引く 备注：						
17	情况：「（气候异常）下起了冰雹。」 「雹が<u>下りてきた</u>。」 →降る 备注：						
18	情况：「（给朋友劝告时）你不应该这么做。」 「そんなことをする<u>はず</u>じゃない。」 →べき 备注：						
19	情况：「（大冬天要洗澡，打开花洒却被淋了一身冷水时）好冷！」 「<u>寒い</u>！」 →冷たい 备注：						
20	情况：「请按右上方的按钮。」 「右上のボタンを<u>押さえて</u>ください。」 →押す 备注：						
21	情况：「（雪糕尝了一口以后）香草的味道。」 「バニラの<u>におい</u>がする。」 →あじ 备注：						
22	情况：「（刚洗完澡）等头发干了再睡吧。」 「髪の毛がもう少し<u>乾燥して</u>から寝よう。」 →乾く 备注：						

23	情况：「（跟人聊天时）说到兴起口水四溅。」 「<u>よだれ</u>を飛ばしてしゃべる。」 →つば 备注：						
24	情况：「（饮料）不要放冰块。」 「氷を<u>置か</u>ないでください。」 →入れる 备注：						
25	情况：「穿裤子。」 「ズボンを<u>着る</u>。」 →履く 备注：						
26	情况：「（你说话时）声音太大了。」 「<u>音</u>が大きい。」 →声 备注						
27	情况：「小孩学东西很快。」 「子供が新しいことを<u>習う</u>のが早い。」 →覚える 备注：						
28	情况：「（要过马路时）红绿灯开始闪了。」 「信号が<u>光っている</u>。」 →点滅する/もうすぐ変わる 备注：						
29	情况：「（打开冰箱一看）豆腐坏了。」 「豆腐が<u>壊れた</u>。」 →痛む/腐る 备注：						
30	情况：「（小孩要碰危险的东西）快阻止他！」 「はやく<u>やめて</u>！」 →とめる 备注：						
31	情况：「必须均衡地摄取各种营养。」 「いろんな栄養素を<u>均等</u>に摂らなくちゃ。」 →まんべんなく/バランスよく 备注：						
32	情况：「（下班后同事约你去唱K）不了，我要回家了。」						

	「いや、もう家に戻る。」 →帰る 备注:						
33	情况：「他被车撞了（现在躺在医院里）。」 「彼は車にぶつけられた。」 →はねられる/ひかれる 备注:						
34	情况：「把电脑带来吧。」 「パソコンを連れてきて。」 →持つ 备注:						
35	情况：「（一听见她有事）他就马上跑来了。」 「すぐ走ってきた。」 →駆けつける/とぶ 备注:						
36	情况：「（衣服的）颜色很浅。」 「色が浅い。」 →薄い 备注:						
37	情况：「如火如荼地准备着后天的比赛。」 「明後日の試合に向かって一生懸命練習している。」 →向けて 备注:						
38	情况：「（压力太大）掉了很多头发。」 「髪の毛がいっぱい落ちた」 →抜ける 备注:						
39	情况：「她比我大（三岁）。」 「彼女は私より三つ大きい。」 →上/年上 备注:						
40	情况：「随身携带防狼器以防万一。」 「万一に向けて防犯ブザーをいつも持ち歩いている。」 →備えて 备注:						

备注：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

非常感谢您的协助！