

12 Incidental and Intentional Learning

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1 Introduction

There are two popular views on what it means to learn a second language. One view holds that it means months and even years of “intentional” study, involving the deliberate committing to memory of thousands of words (their meaning, sound, and spelling) and dozens of grammar rules. The other, complementary, view holds that much of the burden of intentional learning can be taken off the shoulders of the language learner by processes of “incidental” learning, involving the “picking up” of words and structures, simply by engaging in a variety of communicative activities, in particular reading and listening activities, during which the learner’s attention is focused on the meaning rather than on the form of language. These popular views on intentional and incidental learning reflect, at best, only partially the ways in which these terms have been and are being used in the academic literature. Some empirical researchers attribute to them only a specific methodological meaning, in the context of laboratory-type learning experiments. Apart from this methodological sense, incidental and intentional learning have been given various interpretations, sometimes indistinguishable from two more widely used terms, namely implicit and explicit learning, respectively. There are virtually no experimental L2 grammar learning studies which are explicitly presented as “intentional” learning studies, and only a handful which are explicitly presented as studies on “incidental” learning. There is a vast literature, however, of empirical studies in incidental and intentional vocabulary learning. These empirical studies reflect a wide variety of theoretical and educational/pedagogic research questions; they, therefore, do not constitute a coherent research domain, as will become apparent in this chapter.

The first aim of this chapter is to present the various ways in which the terms “incidental learning” and “intentional learning” are used in the psychological literature (section 2) and in the literature on L2 learning (section 3). The second aim is to give an overview of the empirical literature, in particular

of the L2 vocabulary literature (section 4), as there are hardly any empirical studies on incidental and none on intentional L2 grammar learning (section 3.2). As the empirical literature on L2 vocabulary learning is so vast, and as the research questions differ so widely, section 4 confines itself to a number of illustrative examples. In section 5 follows a discussion of two pertinent methodological issues concerning the use of pre-tests and post-tests in incidental and intentional vocabulary learning studies. The chapter is concluded with some remarks concerning the diversity of issues addressed in it and the prospects of the labels “incidental learning” and “intentional learning” being used in the SLA field (section 6).

Readers interested in the various meanings of incidental and intentional learning are advised to turn to section 3; readers interested in vocabulary learning may find section 4 most worthy of their attention, while methodologically oriented readers may be most interested in sections 2.2, 2.4, and 5. Boxes 12.1 and 12.2 give two examples of empirical research. The first study (Horst, Cobb, and Meara, 1998) illustrates how incidental vocabulary acquisition through reading can be investigated; the second study (Griffin and Harley, 1996) illustrates how an intentional design was used in a controlled study to investigate the role of various factors in learning a list of L2 words.¹ These markedly contrasting studies are summarized in the boxes, and features not relevant in the present context have been omitted.

2 Incidental and Intentional Learning in the Psychological Literature

In this section, the notions of incidental and intentional learning are traced back to their roots in psychology. First the rise of incidental and intentional learning is described in the era of stimulus-response psychology. This is followed by a methodological subsection, characterizing so-called Type I and Type II designs in experiments involving incidental and intentional learning. Then the fall and subsequent resurrection of incidental and intentional learning are described in the era of cognitive psychology. In the last subsection, the notion of transfer-appropriate processing, important for a proper understanding of learning experiments, is highlighted.

2.1 The origin of the notions of incidental and intentional learning in stimulus-response psychology

According to early twentieth-century American psychologists such as James, Dewey, Watson, and Thorndike, learning is the forming of associations between sense impressions (stimuli – S) and impulses to action (responses – R). S-R psychologists distinguished various types of associative learning, ranging from

Box 12.1 Incidental learning (Horst et al., 1998)

Main research questions:

- i Does reading a simplified novel lead to increased word knowledge?
- ii Are words that occur more frequently in the text more likely to be learned?
- iii Are words that occur more frequently in the language at large more likely to be learned?
- iv Do learners with larger vocabulary sizes learn more words?

Methodology: This was a one-group pre-test–treatment–post-test study of incidental L2 vocabulary learning.

Subjects: 34 low-intermediate ESL learners in Oman (two intact classes), taking a reading course in preparation for the Cambridge Preliminary English Test.

Task: The teachers read aloud a simplified version of Thomas Hardy's *The Mayor of Casterbridge* (109 pages; 21,232 words), while learners followed along in their books. This required six sessions, over a ten-day period. With the reading-aloud and reading-along procedure all subjects were exposed to the entire text, while creating "the circumstances for incidental acquisition by precluding opportunities for intentional learning" (p. 211). Students "appeared to be absorbed by the story of secret love, dissolution and remorse, and tears were shed for the mayor when he met his lonely death at the end" (p. 211). Students were pre-tested (about a week before the reading session commenced) and post-tested on their knowledge of 45 words of low and middle frequency levels, occurring between 2 and 17 times in the text. It was assumed that the one-week time lapse "would allow the items to be forgotten to the extent that they would not be immediately recognized as testing points when they were encountered in the story. This seems to have been effective; in a discussion held after the post-test, students were surprised to learn that the tested words had occurred repeatedly in *The Mayor of Casterbridge*. Their response also suggests that any word learning that occurred was implicit and incidental" (p. 213).

Results: Mean vocabulary scores were 21.6 and 26.3 (out of 45) in pre- and post-test respectively ($t [33] = 5.81; p < 0.05$).

Conclusions: Concerning the first research question, the authors conclude that these findings "offer conclusive evidence that small but substantial amounts of incidental vocabulary learning can occur as a result of reading a simplified novel" (p. 214), but also that "the power of incidental L2 vocabulary learning may have been overestimated" (p. 220). Concerning the three remaining research questions, sizable word gains are reported (i) when words occurred eight times in the text, (ii) when words (nouns) referred to concrete concepts, and (iii) when readers' vocabulary size was at the (intermediate) 2000 level.

elementary to complex (Gagné, 1965), but all involving the four basic concepts of stimulus, response, feedback, and conditioning. The most elementary form of learning is *signal learning*, requiring the making of a general, diffuse response to a stimulus (e.g., producing tears at the sight of onions). The next form in the learning hierarchy is *stimulus-response learning* (proper), requiring

Box 12.2 Intentional learning (Griffin and Harley, 1996)

Research question: Is it more effective to learn word pairs in L1–L2 order or vice versa?

This practical general question was broken down into the following sub-questions:

- i Given a word pair A–B, is the association between the two components of the word pair bi-directional?
- ii If it is bi-directional, is the forward association, A–B, stronger than the backward association, B–A? Is A more likely to lead to the recall of B than vice versa? (Use of forward association means being tested in the same direction as learning. Use of backward association means being tested in the opposite direction.)
- iii Given that one component is familiar and the other is unfamiliar, is it more effective to learn the familiar–unfamiliar association (L1–L2) or the unfamiliar–familiar association (L2–L1)?
- iv Is production or comprehension the easier task? (Production and comprehension in this context mean, respectively, giving an L2 item in response to an L1 item cue and giving an L1 item in response to an L2 item cue, irrespective of the direction of learning.)
- v Does the direction of learning have an effect on remembering over time? One possibility considered was that, although the French–English bond might appear to be easier to establish, the English–French bond might be stronger over time, due to the initial difficulty of learning and its lack of list dependence.

Methodology:

Subjects: 47 and 63 students from two high schools in Britain, between 11 and 13 years of age, after six months of learning French.

Task: Students were given 20 word pairs to learn, printed on a single sheet of paper. The instructions avoided the word “list” since the test would have the words in a different order from the original.

Students were told that they would have eight minutes to learn the word pairs, that they would then hand back their papers and receive a written test. The test forms contained 20 words (either the English or French members of the learned word pairs); students had to write down the other member of each pair (cued recall). No instruction was given on either the learning technique or the mode of testing. In each school, four groups were formed. The arrangement of experimental groups is shown in table 12.1.

Table 12.1 Arrangement of groups

<i>Group</i>	<i>Direction of learning</i>	<i>Use of forward or backward association at testing</i>	<i>Test condition</i>
1	English–French	Forward	Production
2	French–English	Forward	Comprehension
3	English–French	Backward	Comprehension
4	French–English	Backward	Production

The experiment adopted a $2 \times 2 \times 4$ design, with two between-subject factors and one within-subjects factor. The between-subject factors were (i) use of forward or backward association at testing, and (ii) direction of learning (English–French or French–English). The within-subjects factor was time; students were tested four times: immediately after the learning session (day 1), as well as 3, 7, and 28 days later. No pre-test was administered. None of the French items had been encountered by students in their studies prior to the experiment, and students were not exposed to these words during the following 28 days. In order to answer the five research questions, performance of students in the following groups was compared:

Research questions i and ii: comparison between groups 1 and 2 and groups 3 and 4.

Research question iii: comparison between groups 1 and 3 and groups 2 and 4.

Research question iv: comparison between groups 1 and 4 and groups 2 and 3.

Research question v: a possible interaction between direction of learning and ability to recall over time.

Results: The four groups of school B performed consistently lower than the groups of school A (grand means of 29 percent and 47 percent respectively of words correctly recalled). For simplicity's sake, only performance of school A groups will be reported here. For details, see the original study:

Question i: The association was bi-directional: *contra* behaviorist claims, learning in one direction did not preclude performance in the opposite direction (37 percent in group 3 against 30 percent in group 4).

Question ii: Forward association was stronger than backward association (60 percent mean scores in groups 1 and 2 against 34 percent in groups 3 and 4).

Question iii: Direction of learning did not have a significant effect (45 percent mean scores for English–French learners in groups 1 and 3 and 48 percent for French–English learners in groups 2 and 4). Thus, there is nothing inherently more difficult about learning in the L1–L2 than in the L2–L1 direction.

Question iv: Comprehension scores (52 percent in groups 2 and 3) were significantly higher than production scores (41 percent in groups 1 and 4).

Question v: Performance on day 1 (53 percent) was significantly better than performance on day 3 (45 percent), day 7 (46 percent), and day 28 (43 percent). However, there was no significant interaction between language order at learning and day of testing. The English–French bond and the French–English bond decayed at much the same rate.

Conclusion: The L1–L2 learning condition is, on balance, “the more versatile direction for learning when both production and comprehension are required” (p. 453).

the making of a precise response to a discriminated stimulus. Learning L1–L2 word pairs is an example of stimulus-response learning. Sometimes, however, new words are learned through a series of S-R connections (so-called *chains*; more particularly, verbal chains, called *verbal associations*), as, for instance, when an English learner of French learns the L2 response *illumette* to the L1 stimulus *match* through the mediation of the English word *illuminate* and the

word part *lum*, establishing the verbal chain *match–illuminate–lum–allumette*.² According to psychologists at the time, an important determinant of the formation of associations (in human learning) is the apparent preparedness or state of readiness on the part of the learner, commonly referred to as *set*, *intent*, or *motivation* (Gibson, 1941; Postman and Senders, 1946; Underwood and Schulz, 1960). For many years, approximately from 1940 to 1965, psychologists tried to develop a theory of learning set, intent, or motivation.³ However, because of the difficulty of finding a satisfactory operationalization, researchers began to approach the concept merely in terms of the presence or absence of an explicit instruction to learn. The critical feature in this operationalization is whether or not (in incidental and intentional learning, respectively) participants are told in advance that they will be tested.

2.2 *Experimental operationalization of incidental and intentional learning: Type I and Type II designs*

In the heyday of S-R psychology, many studies were conducted to investigate the effect of a variety of manipulations of the stimulus materials, as well as of some learner variables such as age.⁴ Two experimental methods were employed. The between-group Type I design is characteristic of the earlier studies. Participants in the incidental condition perform an orienting task on the stimulus materials, but they are given no instructions to learn and they are unexpectedly given a retention test afterwards. Participants in the intentional conditions are told in advance that they will later be tested. Early research aimed at demonstrating (i) that incidental learning did indeed exist and (ii) that intentional learning was superior to incidental learning. In the within-group Type II design, which was adopted in most later studies, all participants are instructed to learn some of the stimuli presented to them; but additional stimuli, which participants are not told to learn, are presented at the same time. Retention of the additional stimuli is unexpectedly tested afterwards. Thus, in the Type II design participants are their own controls, serving under both intentional and incidental conditions of learning, being exposed to two categories of stimuli, while expecting to be tested on only one of these. The additional stimuli in the Type II design may be either intrinsic or extrinsic, as illustrated with the following two hypothetical examples:

Example 1, illustrating the use of intrinsic additional stimuli: The stimulus materials contain target words, which are printed either in bold face or in italics and in either red or blue (yielding a 2×2 design of stimulus form). The orienting task focuses participants' attention on color (instruction: "Try to remember which words appeared in red and which ones in blue"). Afterwards, participants are tested on their recall of red and blue words (intentional learning). But, unexpectedly, they are also requested to tell which

words originally appeared in bold face and in italics (incidental learning). In this experimental design, the additional stimuli (typefaces) are said to be intrinsic because they belong to the same entities to which the attended stimuli (colors) belong.

Example 2, illustrating the use of extrinsic additional stimuli: The stimulus materials consist of a list of words some of which are printed in capitals and some in lower case. The orienting task focuses participants' attention on the words in capitals (instruction: "Try to remember the capitalized words"). Afterwards, participants are tested on their recall of both capitalized (intentional) and lower-case words (incidental). The lower-case stimuli are said to be extrinsic to the experimenter-defined learning task, as they do not embody features of the attended stimuli.

2.3 *Incidental and intentional learning in cognitive psychology*

With the decline of S-R psychology and the advent of cognitive psychology in the 1960s and 1970s, marking a fundamental paradigm shift, psychologists lost interest in the concept of set or intention as a central construct in the explanation of human learning and memory performance. This would have meant the demise of the constructs of incidental and intentional learning had not the work of some cognitive psychologists in the 1970s saved them from oblivion, not for theoretical but mainly for methodological reasons. Researchers of *information processing* and *memory* (the labels that replaced *learning*, which was felt to be associated too much with S-R psychology) in the 1970s, unearthed the Type II incidental learning design because it appeared to serve as an excellent tool in the investigation of the effect of various types of information processing on long-term information retention. For instance, in a seminal paper, Hyde and Jenkins (1973) presented groups of participants with a number of words and asked each group to perform a different *orienting task*. Participants were not told in advance that they would be later tested on their recall of the words. Jenkins and Hyde demonstrated that retention on the unexpected test fluctuated with orienting task. For instance, retention scores of participants who had rated the words as to their pleasantness or unpleasantness on a five-point scale (a semantic orienting task) were much higher than those of participants who had to record the part of speech of the words (a non-semantic orienting task).⁵ This and similar studies led Craik and Lockhart (1972) to propose their levels-of-processing theory, which engendered a lively theoretical debate and a great number of empirical investigations using incidental and (to a much lesser extent) intentional learning designs for many years to come (for a review, see Baddeley, 1997, ch. 7). It is through these studies that the notions of incidental and intentional learning have survived to the present day. For contemporary psychologists, their value is based on their record as research tools, rather than on their theoretical substance.

In conclusion, incidental and intentional learning refer, strictly speaking, only to the absence or presence of an announcement to participants in a psychological experiment as to whether they will be tested after the experimental task. Thus, in the incidental case, the experiment may not even be explicitly presented as a “learning experiment,” because the word “learning” itself may already lead to testing expectancies among participants and hence to subject-generated information-processing strategies unwanted by the experimenter. In other words, incidental learning has acquired the status of a tool in the cognitive psychologist’s experimental research kit to investigate some way or ways of information processing as intended by the investigator, not contaminated by ways of information processing not intended by the investigator. The presence or absence of an intention to learn does not figure as a theoretical construct in any current theory of human cognition.

2.4 *Transfer-appropriate learning and the crucial role of the orienting task*

Retention or criterial tasks to be performed after a learning phase may be compatible, incompatible, or neutral to the processing mode of the previous learning task. In connection with this phenomenon of (in)compatibility between learning and retention task, Bransford, Franks, Morris, and Stein (1979) introduced the notion of *transfer appropriateness*. Bransford and his associates (Morris, Bransford, and Franks, 1977) found an interaction between encoding processes (semantic and non-semantic learning tasks) and the product of retrieval processes (semantic and non-semantic retention tasks). Participants who had been administered compatible learning and retention tasks (semantic–semantic, or non-semantic–non-semantic) achieved higher retention scores than participants who were given incompatible learning and retention tasks (semantic–non-semantic, or non-semantic–semantic). The lesson to be learned here is that an accurate assessment of intentional and incidental learning experiments requires a joint consideration of learning and retention task (Eysenck, 1982, p. 225).⁶ This can be illustrated with the study in box 12.2 (Griffin and Harley, 1996). In this intentional learning experiment, participants had to learn and memorize L2 words, which were paired to their L1 equivalents in either the L1–L2 productive order or in the L2–L1 receptive order. At test, the order was either the same as (productive–productive or receptive–receptive) or different from (productive–receptive or receptive–productive) the order during learning. It was found that retention scores on a same-order test were substantially higher than retention scores on a different-order test.

The notion of transfer appropriateness may help to illustrate the difference between incidental and intentional learning. For example, as participants in an intentional vocabulary learning task are told in advance that they will be tested after the learning phase, they will try to store the word information that is to be learned in a form perceived as transferable to the test situation;

and processing instructions during the learning phase in an incidental learning setting may or may not be conducive to successful transfer to the test situation. For instance, participants in an incidental learning vocabulary learning experiment who are instructed to pay attention to the meaning of some new words which appear in a reading text are likely to perform much better on an unexpected receptive post-test than on an unexpected productive post-test. The notion of transfer appropriateness also underscores the crucial importance of the orienting task given in a (Type I) learning study, because the orienting task is the instrument with which the researcher can control or manipulate participants' attention to the information to be learned, and attention is a necessary condition for noticing and learning (Robinson, this volume; Schmidt, 2001).⁷

3 Incidental and Intentional Learning in the L2 Learning Literature

This section will address the question of how incidental and intentional learning figure in the literature on L2 learning. As the field of L2 learning is fragmented into rather isolated sub-domains with little cross-talk, it comes as no surprise that the notions of incidental and intentional learning appear prominently in one domain but not at all in another. Incidental and intentional learning figure in the area of vocabulary (including spelling). They do not appear at all in the areas of phonetics and phonology, however, and only exceptionally in the area of grammar (morphology and syntax).⁸ The reason why the term "intentional learning" does figure in the vocabulary learning literature but hardly in the literature on grammar learning, whereas "incidental" figures in both literatures, is that "incidental," in principle, can apply to abstract as well as to factual declarative knowledge, whereas "intentional" appears to be applicable to factual knowledge only, as will be explained below in section 3.5.⁹

3.1 Weak theoretical interpretations of incidental learning

Incidental learning has often been rather loosely interpreted in common terms, not firmly rooted in a particular theory. It could therefore be said to have several theoretical meanings, in the weak sense. From Schmidt (1994a) three definitions can be derived:

- i The most general meaning is couched in negative terms as learning without the intent to learn (p. 16).
- ii Another interpretation is that it refers to the learning of one stimulus aspect while paying attention to another stimulus aspect. As Schmidt (1994a, p. 16) puts it, incidental learning is "learning of one thing (. . .) when the

- learner's primary objective is to do something else (...)." This meaning of incidental clearly shows its descent from the methodological meaning, mentioned in section 2.1.
- iii A slightly more specific interpretation of incidental learning is that it refers to the learning of formal features through a focus of attention on semantic features. Again, in the words of Schmidt (1994a, p. 16), but now with the previously omitted parenthetical phrases included: incidental learning is "learning of one thing (e.g., grammar) when the learner's primary objective is to do something else (e.g., communicate)."

Recently, Gass (1999) suggested a new, extended meaning for incidental learning as the learning of grammatical structures without exposure to instances of these structures. She refers to two studies on the acquisition of relative clauses (Eckman, Bell, and Nelson, 1988; Gass, 1982) in which learners were exposed to some but not all types of relative clauses and appeared to have learned not only the structures presented to them but also, "incidentally," the structures not presented in the input but implied by the ones that were presented. Thus, in addition to the distinction made in section 2.2 between intrinsic and extrinsic additional stimuli, and somewhat stretching the traditional notion of *stimulus*, one could even postulate a third category of implied, but not presented, and therefore not attended-to, stimuli.

Most L2 learning researchers use incidental learning in connection with the learning of vocabulary through reading.¹⁰ As section 4.1 will show, it is widely believed that most people in literate societies enlarge their vocabularies through reading, focusing on the meaning of words and texts, rather than through the conscious, intentional memorization of lists of word forms and their meanings. A typical and well-known proponent of this view is Krashen (1989), who, in the context of his Input Hypothesis, argues that we acquire vocabulary and spelling through exposure to comprehensible input.

3.2 Empirical studies on incidental L2 grammar learning

In many empirical L2 grammar-learning studies, participants are exposed to L2 data under various experimentally manipulated conditions, without being told that these data represent instances of some feature (principle or rule) of the L2 grammar and that the investigator's aim is to assess the extent to which participants are able to acquire this feature under the experimental conditions. It could be argued that, methodologically speaking, these studies are concerned with incidental learning. For example, in a well-known experiment, Doughty (1991) studied the acquisition of different kinds of English relative clauses by adult ESL learners. The study adopted a between-subjects design that included two experimental groups (and a control group, not relevant in the present context). Participants in one experimental group received meaning-oriented

instruction; participants in the other experimental group received rule-oriented instruction. Neither experimental group was told in advance that they would be tested afterwards on their acquisition of various types of relative clauses. Thus, from a methodological perspective, both experimental groups can be called incidental groups. However, as the use of the term “incidental learning” would not have had a theoretically relevant meaning in this study, Doughty, understandably, found no reason to use this term.¹¹

Only three experimental L2 grammar-learning studies appear to have explicitly used the term “incidental,” but none of them pitted incidental against intentional learning. The first study (Hulstijn, 1989) involved three experimental groups (Form, Meaning, and Form and Meaning). Theoretically, the study is presented as one of implicit learning, meaning that learners were not consciously aware of the grammatical target features under investigation. Methodologically, the study is presented as an incidental learning study: “Ss were not informed about the research questions until after the completion of the last test, and, while carrying out a current task, did not know whether a subsequent test would follow” (p. 54). The second and third studies (reported, respectively, in Robinson 1996a, 1996b, 1997) involved four experimental conditions: Implicit, Incidental, Explicit Rule Search, and Explicit Instruction (in the 1996 study), and Implicit, Incidental, Enhanced, and Instructed (in the 1997 study). The implicit and incidental conditions were alike “in not requiring a conscious focus on the grammatical form of the stimuli presented during training. In the implicit condition the task instruction is to memorize sentences, whereas in the incidental condition the task instruction is to read the sentences and understand their meaning” (Robinson, 1996b, p. 35). Robinson, who motivates his use of the term “incidental” by a reference to Paradis (1994, p. 394), whose definition will be quoted in section 3.4, appears to use “incidental” to refer to learning of L2 forms through a focus of attention on meaning, as in the third definition mentioned in section 3.1.

In summary, although some definitions of incidental L2 grammar learning have been proposed in the literature (in particular, Gass, 1999; Schmidt, 1994a), no reports of empirical L2 grammar learning studies have so far been published which explicitly base themselves on the Schmidt or Gass definitions. This is quite understandable, as the notion of implicit learning has had a greater appeal among SLA researchers than the notion of incidental learning (see section 3.4; DeKeyser, this volume; Doughty, this volume).¹²

3.3 The meaning of “intentional” in the vocabulary-learning literature

In the literature on vocabulary learning, when used at all, “intentional learning” is commonly given a cognitive interpretation, as the rehearsal and memorizing techniques invoked by learners when they have the explicit intention of learning and retaining lexical information (Schmitt, 1997).

3.4 *The differences between incidental and implicit and between intentional and explicit types of learning*

For many authors, incidental and intentional learning overlap with, or even become indistinguishable from, implicit and explicit learning respectively. There are several interpretations of the terms “implicit” and “explicit” learning (see DeKeyser, this volume). The most characteristic feature, however, distinguishing implicit from explicit learning is the absence or presence of “conscious operations” (N. Ellis, 1994, p. 1), a notion also referred to as the absence or presence of “awareness at the point of learning” (Schmidt, 1994a, p. 20). Note that none of the definitions of incidental and intentional listed in section 3.1 is synonymous with the definitions of implicit and explicit learning given by Ellis and Schmidt. In line with Schmidt (1994a), it is recommended here that the distinctions between incidental and implicit and between intentional and explicit should be maintained. Paradis (1994, p. 394), for instance, distinguishes incidental from implicit in the following definition of implicit competence, which “is acquired incidentally (i.e., by not focusing attention on what is being internalized, as in acquiring the form while focusing on the meaning), stored implicitly (i.e., not available to conscious awareness), and used automatically (i.e., without conscious control).” Thus, incidental learning, in all the definitions listed in section 3.1, is always implicated in implicit learning; implicit learning thus entails more than what is meant by incidental learning.

In a similar vein, it is recommended here that a distinction be maintained between intentional and explicit learning. Whereas explicit learning involves awareness at the point of learning (e.g., by trying to understand what the function of a certain language form is), intentional learning involves a deliberate attempt to commit new information to memory (e.g., by applying rehearsal and/or mnemonic techniques).

3.5 *Confusions concerning the interaction of the what and how of incidental and intentional learning*

The nagging problem in discussions concerning incidental and intentional (as well as implicit and explicit) learning is that, although the definitions of these terms appear to refer to the *how* of learning (learning mechanisms), their interpretations depend on authors’ views on the *what* of learning (the representation of knowledge in the mind/brain).¹³ For instance, it is relatively easy to imagine the intentional learning of a list of L2 words, as these form–meaning connections are readily conceived of as instances of declarative, factual knowledge. However, as soon as we define the *what* of learning as abstract knowledge of properties of L2 grammar (e.g., knowledge of the L2 setting of the pro-drop parameter), it is almost impossible to conceive of the acquisition of this abstract grammatical feature taking place through intentional learning.

It is much easier, it seems, to conceive of the acquisition of this feature taking place through implicit, and hence through incidental learning (see section 3.4). This and similar interactions between the *what* and *how* of L2 learning have caused, and continue to cause, confusions in the L2 learning literature.¹⁴ It comes as no surprise, therefore, that the area in which “incidental” and “intentional” are used most frequently is that of vocabulary learning. Vocabulary knowledge can easily be conceived of as a type of declarative knowledge, and it is declarative knowledge which can be learned intentionally (e.g., with various memory aids) as well as incidentally (e.g., through reading and listening). It can be concluded that incidental and intentional learning are differentially important for different classes of target language features: whereas incidental is used in connection with the learning of both abstract and factual knowledge, the use of intentional is restricted to the learning of factual knowledge. When used in connection with factual knowledge, incidental and intentional learning in the realm of language (e.g., learning vocabulary items, writing systems, spelling rules, conventions for addressing people in oral or written discourse according to their age, sex, and status) does not appear to differ from incidental and intentional learning in other walks of life (e.g., learning geographical names, historical events).

3.6 The issue of two poles on a continuum as opposed to two distinct categories

Should incidental and intentional learning be thought of as two distinct learning processes or as poles on a continuum? There is no simple answer to this question. As Schmidt (1994a, 1994b) has argued, there is no learning without attention and noticing. This is true not only for implicit but also for incidental learning. Incidental and intentional share the involvement of attention and noticing (see the quotation from Paradis, 1994, p. 394, in section 3.4). Thus, in the dimension of attention and noticing, incidental and intentional do not form two distinct categories. However, this still leaves open possibilities of distinct processes in other dimensions. As was mentioned and illustrated in section 3.2, incidental and intentional are not juxtaposed to each other in the L2 grammar-learning literature. The polarity issue, therefore, does not seem to play a role in the domain of grammar learning. In the L2 vocabulary-learning literature, however, incidental and intentional learning are seen as distinct categories, in that intentional learning does, and incidental does not, imply the use of deliberate retention techniques.

In conclusion, on the one hand, both incidental and intentional learning require some attention and noticing. On the other hand, however, attention is deliberately directed to committing new information to memory in the case of intentional learning, whereas the involvement of attention is not deliberately geared toward an articulated learning goal in the case of incidental learning.

4 Empirical Studies on Incidental and Intentional L2 Vocabulary Learning

This section deals with the empirical research on incidental and intentional L2 vocabulary learning. Recent reviews of (parts of) the extensive literature can be found in Nation (2001), Singleton (1999), and collections edited by Coady and Huckin (1997), Schmitt and McCarthy (1997), and Wesche and Paribakht (1999).

4.1 *Incidental vocabulary learning through extensive reading*

This section addresses the popular view that people learn most of their L1 and L2 vocabularies through incidental learning (mostly, but not exclusively, reading) rather than through intentional learning. The issue itself is examined first (in section 4.1.1); the empirical evidence is reviewed next (in section 4.1.2).

4.1.1 *The default argument*

As stated in section 3.5, it is widely believed in the applied field of language pedagogy that most vocabulary, in L1 as well as in L2, is acquired in an incidental fashion, as the by-product of reading and listening activities not explicitly geared to vocabulary learning. Furthermore, it is widely held that little vocabulary is acquired in an intentional fashion, through activities aimed at deliberately committing lexical information to memory and keeping that information readily accessible. Influential in this respect have been publications by Nagy and Anderson (1984), Nagy and Herman (1987), and Nagy, Herman, and Anderson (1985). These researchers showed that American high school students know between 25,000 and 50,000 words, and argued that students cannot have learned such a large number of words solely by means of explicit vocabulary instruction. Rather, students must have learned most words in an incremental way through repeated encounters during extensive reading. A meta-analysis of 20 experiments examining incidental L1 word learning during normal reading, conducted by Swanborn and De Glopper (1999), showed that students learn around 15 percent of the unknown words they encounter. The learning of an unknown word while reading is affected by several factors, such as pre-test sensitization, students' grade levels, students' level of reading ability, the sensitivity of assessment methods to partial word knowledge, and the amount of text surrounding the target words.

The vocabulary-acquisition-through-reading argument is a default argument: because relatively few words are explicitly taught, most words must have been acquired from reading.¹⁵ It has led, however, to various pedagogical interpretations (Coady, 1997). Some educationalists claim that students will learn all the vocabulary they need from context by reading extensively (Krashen, 1989). Others, however, while acknowledging the usefulness, even necessity,

of extensive reading, have emphasized the importance of making L2 learners aware of their vocabulary learning task and of teaching explicit strategies for vocabulary learning (see Sökmen, 1997, for a review).¹⁶

4.1.2 Empirical L2 evidence

Studies of incidental vocabulary learning through extensive reading by L2 learners have been conducted by Cho and Krashen (1994) and Dupuy and Krashen (1993). These studies claim substantial vocabulary gains through reading. Wode (1999) conducted a pilot study of incidental learning of productive vocabulary over a seven-month period in a grade-7 immersion program in a German high school (English L2, German L1). One immersion class was compared with two control groups. The immersion class had, in addition to regular English-as-a-subject lessons, one subject (history) taught in English (by a German, non-native speaker). The two control classes, one from the same school as the immersion class, and one from another school which did not offer immersion, had only regular English-as-a-subject. Wode reports that, in an oral production post-test, the immersion group “used a considerably larger vocabulary than the two control groups in terms of both types and tokens” (p. 249).

Three studies have been conducted of the reading of a novel (in English) containing unknown words. These studies are, in chronological order: Saragi, Nation, and Meister (1978); Pitts, White, and Krashen (1989); and Horst et al. (1998). In the Saragi et al. study, 20 native speakers of English read Anthony Burgess’s novel *A Clockwork Orange*, containing 241 unfamiliar words, mainly of Russian origin, that are used as a kind of slang called *nadsat*. Frequency of occurrence of these *nadsat* words ranged from 88 to 1, with a mean of 15. Participants did not know that the *nadsat* vocabulary would be tested afterwards; instead, they were told that they would be given a comprehension and literary criticism test. It was found that “repetition affects learning, but that the relationship is considerably complicated by other factors like meaningfulness of the context and similarity to words in the mother-tongue” (p. 76). In the Pitts et al. study, two groups of ESL learners read two chapters of *A Clockwork Orange* and were subsequently tested for their understanding of the *nadsat* words. Small vocabulary gains were recorded relative to control groups who had not read the text. The researchers claim this shows that L2 learners can acquire vocabulary by reading. The Horst et al. study is reported in box 12.1. The authors of this study conclude that the power of incidental L2 vocabulary learning may have previously been overestimated. (See section 4.3, for typical retention rates in more controlled experimental studies.)

4.2 Other incidental vocabulary studies under experimentally manipulated reading conditions

Many studies of incidental L2 vocabulary learning through reading or listening have been conducted to investigate the influence of a variety of factors pertaining to characteristics of target words, input modality (reading vs. listening;

reading vs. writing), frequency of exposure, characteristics of the verbal and non-verbal context, and presence or absence of cues as to the meaning of the target words (e.g., marginal glosses, opportunity to consult a dictionary). As almost all of these studies have been conducted since the behaviorist–cognitivist paradigm shift in psychology, most of them situate their research question, implicitly or explicitly, within an information-processing framework, sharing the assumption that “memory performance is determined far more by the nature of the processing activities engaged in by the learner than it is by the intention to learn per se” (Eysenck, 1982, p. 203). Most studies refer, in this respect, to the classical notions of *depth of processing* (Craik and Lockhart, 1972) and *elaboration* (Craik and Tulving, 1975). Recently, Laufer and Hulstijn (2001) tentatively proposed the notion of *involvement*, consisting of (i) a motivational component, comprising the *need* to determine a new word’s meaning, and (ii) a cognitive component, comprising *search* (e.g., dictionary look-up) and *evaluation* (e.g., evaluating whether the information obtained from the dictionary applies to the verbal and non-verbal context). Each of these three factors can be absent or present during the processing of a new word in a natural or artificially designed task. The authors hypothesize that retention of hitherto unfamiliar words is conditional, in general, upon the degree of involvement in processing these words. The concept of involvement can be operationalized and submitted to empirical investigation by devising incidental-learning tasks with various degrees of need, search, and evaluation.

The following factors have been studied for their potential effects on incidental L2 vocabulary learning: new word density (Holley, 1973), new word frequency (Hulstijn, Hollander, and Greidanus, 1996; Rott, 1999), oral input (Loschky, 1994; R. Ellis, 1995; R. Ellis and Heimbach, 1997; and R. Ellis, Tanaka, and Yamazaki, 1994), oral vs. written input in watching subtitled cartoon films (d’Ydewalle and Pavakanun, 1995; Van de Poel and d’Ydewalle, 2001), reading vs. writing (Hulstijn and Trompeter, 1998), glossing and/or inferencing (Cobb, 1997; Cobb and Horst, 2001; Hulstijn, 1992; Hulstijn et al., 1996; Kost, Foss, and Lenzini, 1999; Watanabe, 1997), and dictionary use (Fischer, 1994; Hulstijn et al., 1996; Knight, 1994; Laufer and Hill, 2000). The results show a differentiated pattern, consistent with the view that it is elaboration of (Craik and Tulving, 1975) or involvement in (Laufer and Hulstijn, 2001) the lexical information being processed rather than any of these factors per se that determines retention. For L2 educators it is important to note that deep information processing normally requires more time than superficial information processing. Thus, for each device, the benefits must be assessed against the costs. For example, glossing gives a high return in terms of comprehension but a low return in terms of retention, when glossed words appear only once in a text. Retention of glossed words, however, increases substantially when they reoccur several times. On the other hand, retention of words whose meaning has to be inferred may be relatively high, but this benefit comes at the price of time and with the danger of incorrect inferencing (and consequently of learning incorrect word meanings) if no corrective feedback is given.

4.3 Differences in learning rates between incidental and intentional learning conditions

In general, retention rates under genuine incidental learning conditions are extremely low (Swanborn and De Glopper, 1999), depending, of course, on the factors mentioned above (frequency of occurrence, presence or absence of a cue, relevance of the target word, etc.). Retention rates under intentional learning conditions are, again on average, much higher than under incidental conditions. For example, in experiment 4 of a study conducted by Hulstijn (1992) native speakers of Dutch read an expository text of 907 words, containing 12 unfamiliar pseudo-words. Each pseudo-word occurred only once and was supplied with an L2 marginal cue as to its meaning. Half of the participants (N = 24) performed the reading task under incidental learning conditions. They were instructed to read the text carefully and prepare for answering some reading comprehension questions, which were to be given after reading, without the text being available. The other half of the participants (N = 28) performed the same task but under intentional conditions, that is, they were informed in advance that there would be a vocabulary-retention task after completion of their reading task. The average retention ratios of participants in incidental and intentional groups were 4 percent and 53 percent respectively on the immediate post-test in which all 12 target words were tested in isolation, and 43 percent and 73 percent on a subsequent post-test in which target words were tested in their original context. In a similar study, Mondria and Wit-de Boer (1991) asked Dutch high school students to learn eight French content words, which were presented in sentence contexts of varying strength along with their L1 translation. Study time was 10 minutes. The mean retention score under this form of intentional learning was 5.2 (65 percent).

In boxes 12.1 and 12.2, one incidental and one intentional vocabulary learning study are summarized (respectively Horst et al., 1998, and Griffin and Harley, 1996). Retention scores in these two studies differed substantially: an increase of 10 percent between pre- (48 percent) and post-test (58 percent) in the incidental study, and average retention scores of 29 percent and 47 percent in the two groups involved in the intentional study. These differences, in hindsight, may not be surprising, given the marked differences between the two studies in design and method. In order to avoid premature educational conclusions concerning the alleged superiority or inferiority of intentional over incidental learning, two points must be borne in mind.

The first is that it is almost impossible to control for “time on task” in comparisons conducted under educationally valid circumstances. For instance, in the study by Hulstijn (1992), mentioned above, students in both the incidental and intentional conditions did much more than processing unfamiliar lexical items. They were instructed to read the text and prepare for answering comprehension questions. Thus, the experimenter did not have control over

how participants used the allotted time. Students in the intentional group may have spent more time on rehearsing the 12 unknown words and less on preparing for the upcoming comprehension questions than the incidental group, although performance on comprehension questions did not differ between the two groups. Studies which try to exert maximal control over information processing during exposure have little relevance for L2 pedagogy. A good example is a classic experiment conducted by Hyde and Jenkins (1973), typical of the sort of experiments conducted by psychologists at the time. Participants in this study were native English undergraduate psychology students. There were 20 experimental groups and two control groups. Participants listened to one of two lists of 24 English words, recorded at 3-second intervals. The lists consisted of 12 pairs of either unrelated (List 1) or associated words (List 2). While listening, students in the experimental groups had to perform one of five orienting tasks: (i) rating the words on a five-point rating scale of (un)pleasantness; (ii) estimating the frequency with which the words are used in the English language; (iii) making a check on whether the letters E and G occurred in the words; (iv) recording whether the words were nouns, verbs, or adjectives; and (v) indicating whether the words could or could not fit in two sentence frames ("It is —" and "It is a —"). Hyde and Jenkins classify the first two tasks as semantic and the remaining three as non-semantic.¹⁷ Ten of the 20 experimental groups were told in advance that their recall of the 24 words would later be assessed (intentional condition); the other ten were not given this advance information (incidental condition). Students in the two control groups were not given orienting tasks but were simply instructed to remember the words and informed of an upcoming recall task (intentional condition). One control group was exposed to List 1 and the other to List 2. The design can be described as a 2 (List) \times 5 (Orienting Task) \times 2 (Intentionality) design, plus two control groups.

The following findings deserve to be mentioned in the present context. Semantically associated List 2 words were better recalled than unrelated List 1 words, regardless of other factors. Among the 20 experimental groups, groups in the two semantic orienting tasks (i and ii) outperformed groups in the three non-semantic orienting tasks (iii, iv, and v). Groups under intentional learning conditions obtained significantly and substantially higher recall scores than those under incidental conditions only when given the two semantic orienting tasks, whereas the two control groups (intentional condition – no orienting task) did *not* outperform the intentional groups in the semantic orienting tasks (i and ii). These results illustrate that retention is determined more by the nature of the processing activities than by learning intention (knowing or not knowing that retention will be assessed after exposure), as observed by Eysenck (1982, p. 203; see the quotation in section 4.2) and Postman (1964, p. 190). Thus, whereas most incidental L2 vocabulary-learning studies could not exert optimal control on information processing, the Hyde and Jenkins study was designed as a highly controlled study.¹⁸ That study, however, has hardly any relevance for L2 pedagogy, as participants did not

learn new words (form–meaning connections) and were exposed to each target item only once during a session which lasted only 72 seconds in total!

The second point is that most of the incidental L2 vocabulary-learning studies mentioned in section 4.2 were designed to assess the effect of information processing during the execution of a task in which new words were encountered for the first time. Their results are valid, and educationally relevant, only as far as this initial encounter is concerned.¹⁹ What is far more relevant for educational practice is that long-term retention of new vocabulary normally requires frequent exposures or rehearsal, regardless of the conditions under which new words have initially been encountered.²⁰

4.4 *Studies of intentional L2 vocabulary learning*

Researchers have used intentional learning designs to investigate a wide variety of research questions (cf. the classic experiments conducted by Crothers and Suppes, 1967). This subsection will confine itself to some illustrative examples of studies based on psycholinguistic and educational-pedagogical research questions (in sections 4.4.1 and 4.4.2 respectively).

4.4.1 *Psycholinguistic studies*

Most of the paired-associate research in the behaviorist era dealt with the pairing of two known words and has therefore not been considered relevant to the needs of L2 learners. Yet the method of paired-associate learning, involving L1–L2 word pairs, under intentional learning conditions, has occasionally been applied by cognitive psychologists in the post-behaviorist era, as the study by Griffin and Harley (1996) illustrates (see box 12.2). The experiments on the important role of the phonological loop in short-term memory for both L1 and L2 vocabulary learning, conducted by Baddeley and his co-workers, are famous. Papagno, Valentine, and Baddeley (1991) demonstrated that articulatory suppression of L2 items with high semantic association value did not impair learning, but that articulatory suppression of L2 items with low semantic value did, suggesting that articulatory rehearsal plays a role in L2 vocabulary learning, particularly when the words to be learned cannot be easily associated semantically with L1 words. Service and Craik (1993) manipulated the phonological similarity between English L1 words and the words to be learned (Finnish vs. pseudo-words) and the associative value of the L1 cue words (high vs. low imaginability) and found that both younger (age range between 20 and 40 years) and older adults (60 years and older) profited from phonological similarity and associative value.²¹ Atkins and Baddeley (1998) demonstrated that individual differences in verbal, but not in non-verbal, working memory affect intentional L2 vocabulary learning substantially.

The intentional learning paradigm, in which participants are instructed to learn verbal information in association with other verbal or non-verbal (e.g., pictorial) information, offers an ideal testing ground for theories of the organization of the mental lexicon, monolingual as well as bilingual. Research in this

vast area, mainly conducted in the laboratories of psychology departments and published in psychological journals, is reviewed by, for instance, Kroll and De Groot (1997). Recently, Lotto and De Groot (1998) examined the roles of learning method (translation vs. picture), word frequency, and cognate status. During the learning phase of the experiment, 80 L2 words were presented in three rounds, with either their L1 translation or a picture. During the test, which measured productive L2 vocabulary knowledge, either the pictures or the L1 translations constituted the cues for recall of the L2 words. The results showed that the translation learning condition resulted in better recall performance than the picture condition, and cognates and high-frequency words were easier to learn than non-cognates and low-frequency words (see also N. Ellis and Beaton, 1993).

Kroll, Michael, and Sankaranarayanan (1998) investigated L2 vocabulary learning under conditions differing in the allowance of L1 word mediation and concept mediation. The results show that, even when semantic (pictorial) information is salient, learners are likely to rely on mediation via L1. In contrast, the presence of novel perceptual information (pictures were presented in a non-canonical, upside-down, format) appears to benefit vocabulary learning. On the basis of their results, the authors hypothesize that “adding a unique cue in memory during L2 learning later facilitates the ability to think conceptually in the second language, as long as the cue can be associated to an already familiar concept” (p. 390).

The third and final example to be mentioned here is the study by Yang (1997), who conducted a longitudinal investigation of computer-aided learning of (artificial) vocabulary (word translation, word recognition, and semantic priming) over an instruction period of five weeks. Participants in this study were 29 American undergraduate students. In this unique study, which was partly based on earlier work by Kroll and her associates, Yang found that semantic priming – indicative of connectivity in the semantic network – was intact very early. This was reflected in the early accurate (but slow) performance in the translation and semantic priming tasks. However, speed of performance in the word recognition task increased slowly and continued to benefit from instruction. It is important to note that, as in so many psycholinguistic studies, vocabulary learning in many of these psycholinguistic L2 studies was measured in terms not only of response correctness but also of response latency (as an indication of degree of automatization).

4.4.2 Practice-based, educational studies

Intentional vocabulary learning can take place in a wide variety of instructional settings. A continuing debate among teachers and learners concerns the questions of (i) whether it is better to learn words in monolingual (new L2 item explained with familiar L2 item) or bilingual (new L2 item explained with L1 translation) lists, and (ii) whether it is better to present new words in context or in isolation (word list format). A classic study addressing the former

issue is that by Oskarsson (1975), who presented adult Swedish learners of English with texts containing unfamiliar target words glossed either in English (monolingual glosses) or in Swedish (bilingual glosses). Students knew in advance that they would later be tested on their word knowledge. Retention over all groups and texts consistently favored the bilingual condition (with an average retention score of 18.6, over an average of 14.7 in the monolingual condition, out of a maximum of 35). Studies addressing the latter issue, context or no context (Grace, 1998; Lawson and Hogben, 1996; Mondria and Witde Boer, 1991; Prince, 1996; Qian, 1996; Seibert, 1930), have obtained mixed results, probably due to the fact that, as Nation (1982) and Nagy (1997) have pointed out, context is a multifaceted construct. Tinkham (1993), Waring (1998), and Schneider, Healy, and Bourne (1998) investigated whether it is good practice, as dictated by most L2 teaching materials, to have learners study lists of semantically related items (such as words for clothes) or whether it is better to have students learn lists of unrelated words. In all three studies it was found that presenting words in semantic clusters interferes with learning (see also Royer, 1973).

It appears that a number of researchers have investigated various presentation and rehearsal regimes (with and without feedback) in computer-aided instruction, but such studies are almost never published in international journals. These studies continue the tradition of the paired-associate learning experiments with "learning machines" that were so common in the behaviorist era. This line of research is of great practical interest, but it appears that, unfortunately, too little research money and interest are invested in it.

The last body of empirical research using intentional learning designs to be mentioned in this subsection concerns the study of mnemo-techniques. The technique most studied is the so-called *keyword method*, involving the use of memory-facilitating mediator words aimed at helping the learner make a link between the form and meaning of an L2 word that is to be learned. The mediating word should ideally be associated in sound with the form of the word to be learned, while simultaneously being available to a visual representation in which the meaning of the word to be learned can somehow be incorporated (preferably yielding a bizarre, and therefore highly memorable, picture). For example, an English person learning the German word *Raupe* (meaning *caterpillar*) could use the English word *rope* (similar in sound to *Raupe*) as a keyword, while constructing a mental image of a caterpillar stretched out to more than its fullest length (exaggeration helps) on a rope. Research in this area has been reviewed by Cohen (1987), N. Ellis and Beaton (1993), Hulstijn (1997a), and Rodríguez and Sadoski (2000). Cohen (1987) concludes his review with the claim that memory techniques have been shown to produce high retention rates but are not intended to replace other, more natural, approaches to vocabulary learning. Similarly, Hulstijn (1997a) advises that the keyword technique should only be used for words that, for whatever reason, have not been successfully acquired along normal routes.

5 Methodological Issues in Incidental and Intentional Vocabulary-Learning Studies

Boxes 12.1 and 12.2 contain examples of incidental and intentional vocabulary learning experiments (Horst et al., 1998, and Griffin and Harley, 1996, respectively). Both investigations were conducted with participants who already had some knowledge of the L2. This raises the problem of how to control for prior vocabulary knowledge in such investigations. Furthermore, in both studies participants' knowledge of the words to which they had been exposed in the treatment phase was tested only in a single post-test; no subsequent, delayed post-tests were administered to assess long-term retention. This absence of the measurement of long-term retention is often disapproved of. This section offers a methodological discussion of both these issues: (i) the possibility that learning targets (words to be learned) are already familiar to some of the subjects prior to the experiment (section 5.1), and (ii) the question of whether it is sufficient to use immediate post-tests only, or whether delayed post-tests are required (section 5.2).

5.1 *Pre-testing*

One of the problems in designing vocabulary-learning experiments is controlling for pre-knowledge of the target words. When participants already have some L2 knowledge, it is hard to rule out the possibility that they have (partial) knowledge of the target words used in the experiment. This was clearly the case with the study summarized in box 12.1 (Horst et al., 1998). The researchers of the study summarized in box 12.2 (Griffin and Harley, 1996) confined themselves to consulting the teachers concerned, according to whom none of the 20 selected target words had been encountered by students in their classes until then; but Griffin and Harley did not include a pre-test in their design in order to verify whether students were indeed unfamiliar with the target words.

One way of dealing with the pre-knowledge problem is to ask participants after the experiment proper to indicate whether they already knew the words before the experiment, and then to exclude the data on pre-known words from analysis. This method, adopted, for instance, by Hulstijn et al. (1996), has two disadvantages: (i) participants' responses will vary in reliability, and (ii) removal of data on some target words for some participants will limit the power and validity of statistical analyses.

To tackle the issue of reliability at least to some extent, the following method could be adopted.²² Approximately one week prior to the experiment, participants are pre-tested. They are given a list of words (or rather letter sequences) and instructed to indicate which they do and do not know. Participants are told that the list contains some pseudo-words and that yes-responses to pseudo-words will be subtracted from their yes-responses to real words. These measures aim at limiting participants' tendencies to overestimate their word knowledge.

The list should be composed of (i) experimental target words, (ii) non-target words, and (iii) pseudo-words, in random order. To correct for guessing, the following formula could be used: the proportion of hits on words minus the proportion of false alarms on pseudo-words, divided by one minus the proportion of false alarms on pseudo-words (see Shu et al., 1995, p. 82).

After the experiment, participants must be tested again on both the target and non-target words in order to determine what proportion of any increase in knowledge of target words, between pre- and post-test, must be ascribed to learning and what proportion must be ascribed to the effect of retesting (to be calculated with the scores on the non-target words). Obviously, however, this method still does not rule out the possibility that some target words are already known before the experiment. To minimize this possibility the researcher could either use extremely rare or obsolete words, or words only used in professions to which participants do not belong; to rule out the possibility altogether, the researcher must use pseudo-words as target words.

In a series of five experiments of incidental word learning through text reading, Hulstijn (1992) adopted a so-called *twin approach*: the same Dutch reading text was used in all experiments; the target words were pseudo-words in two experiments, using native speakers of Dutch as participants; the target words were real (low-frequency) words in the three remaining experiments, using Dutch L2 learners as participants. The rationale for this twin approach, as discussed in Hulstijn (1997b, p. 136), is that an experiment with (partly) artificial input, such as pseudo-words, ranks relatively high on reliability (control of participants' prior knowledge) but possibly low on (ecological) validity. This is offset, however, by the accompanying experiment with natural language input ("real" L2 learners, learning a "real" L2, containing "real" and "useful" words), ranking relatively high on ecological validity but possibly low on reliability. The researcher then hopes that the results of the twin experiments dovetail nicely, allowing for interpretations that can be credited with both reliability and validity.

5.2 *Long-term retention and the use of immediate post-tests in incidental and intentional learning studies*

The results of vocabulary-learning experiments whose design includes immediate but no delayed post-tests often meet with skepticism from teachers as well as researchers. They question the validity and relevance for L2 instruction of studies showing that, after a single incidental or intentional learning session, method A yields higher retention rates than method B. They tend to dismiss results of such studies unless delayed post-tests, administered after days, weeks, or even months, reveal that method A remains superior to B. On first sight, this skepticism may seem justified. On closer inspection, however, this argument fails, as will be demonstrated in this subsection.

Research on this issue was conducted by Wang, Thomas, and Ouellette (1992) and Wang and Thomas (1995). Participants in the first investigation studied new words either by the keyword method or in rote rehearsal; participants in the second investigation studied new words either by the keyword method or using a non-mnemonic (i.e., semantic-context) strategy. In both studies, retention interval (immediate vs. delay) was treated as a between-subjects factor. The findings consistently indicated that whereas the keyword method yielded higher retention scores than the other two methods when participants were tested immediately after the learning session, the reverse pattern was obtained when participants were not tested immediately afterwards but only after some delay.²³ The authors conclude from these findings that keyword-based memories are especially fragile over time and will benefit from repeated testing and rehearsal.

The results of these studies and the conclusions of their authors, however, provide no evidence for claims that the results of vocabulary learning experiments using only immediate post-tests lack (theoretical or educational) relevance. In evaluations of learning experiments one must bear in mind two considerations: (i) with an immediate post-test, the researcher is able to measure the effect of cognitive processes during the learning session – nothing more, nothing less; and (ii) long-term retention of factual knowledge (such as lexical form–meaning pairs) will almost always require frequent exposure or frequent rehearsal. Research on vocabulary learning, whether under incidental or intentional learning conditions, aimed at addressing questions concerning the effect of cognitive processing during a learning session in which words are presented for the first time, requires only an immediate post-test. Inclusion of delayed post-tests in such research would make no sense, because it would not be possible to differentiate the extent to which performance on delayed post-tests is affected by processes during the experimental learning session or by processes (if any) after that session. In principle, these two types of processes could stand in coalition or in competition with one another. However, in vocabulary learning research aimed at addressing questions concerning maintenance or rehearsal of word knowledge, that is, after new words have initially been presented and processed in different learning modes, and in research on ease of relearning (Schneider et al., 1998), participants in all initial learning modes should be given time to reach the same level of (initial) learning so that the chances of maintaining or forgetting word knowledge is equal for them all. In conclusion, experiments comparing different methods of cognitive processing of new lexical material need only immediate post-tests; their educational significance should be evaluated independently from the issues of maintenance, rehearsal, and forgetting.

6 Conclusions

The issues raised and discussed in this chapter exhibit a wide diversity. The chapter deals with theories of language learning, methods of empirical

research, grammar vs. vocabulary learning, and psycholinguistic vs. educational issues. The reason for the chapter's diversity resides in the fact that the labels "incidental" and "intentional" learning have been used to refer to widely differing constructs over a period of more than five decades. They have been used differently (i) across disciplines (e.g., psychology vs. first and second language acquisition vs. education and language pedagogy), (ii) over time within disciplines (e.g., behaviorist vs. early vs. late cognitive psychology; acquisition of grammar vs. acquisition of vocabulary), and (iii) between dimensions of academic inquiry (theory construction vs. development of research methods).

Having served so many different purposes during so many years, is there still a viable role for the labels "incidental" and "intentional" learning to play in the SLA field? Yes, there is. First, "incidental" and "intentional" learning will continue to be useful as technical terms in the experimental literature. As long as researchers continue to conduct L2 learning experiments with a pre-test-treatment-post-test design, it will be mandatory to consider whether participants at the beginning of the treatment (in the SLA literature often called "task" or "input exposure") will or will not be told that they will be tested afterwards, and if so, what sort of post-test to expect (section 2.2). In line with tradition, learning sessions with and without such a pre-warning can be conveniently referred to as "incidental" and "intentional" respectively. This is their *methodological* use. As far as SLA *theory* is concerned, it is not likely that either term will soon receive (or regain) a strong theoretical meaning (section 3). In the areas of second language education and pedagogy, however, the term "incidental learning" can still be fruitfully used as a convenient, informal, non-theoretical term referring to the more or less "unintentional," "incidental" acquisition (or "picking up") of language (grammar, vocabulary, orthography, pronunciation, etc.) during the performance of communicative tasks requiring an attentional focus on the meaning and function of language rather than on its form.

NOTES

- 1 In this chapter, no distinction is made between second and foreign language learning ("L2" is used throughout), or between acquisition and learning ("learning" is used throughout).
- 2 For an illustration of Gagné's learning types with examples taken from L2 learning, see Ingram (1975).
- 3 Eysenck (1982) gives a critical discussion of the most pertinent issues in the debate.
- 4 For an overview of the extensive literature, see McLaughlin (1965) and Postman (1964).
- 5 More information on this classic study is given in section 4.3.
- 6 Tulving (1979) therefore advocates the inclusion of at least two different

- retention tasks in all learning experiments.
- 7 The notion of transfer-appropriate processing is also used in the context of the attainment of automaticity in fluent L2 performance (Segalowitz, 2000).
 - 8 Standard textbooks on L2 learning, such as Cook (1993), R. Ellis (1994), Gass and Selinker (1994), Larsen-Freeman and Long (1991), Lightbown and Spada (1993), Mitchell and Myles (1998), Sharwood Smith (1994), Spolsky (1989), Towell and Hawkins (1994), and Van Els et al. (1984) include neither “incidental” nor “intentional” in their indexes. They are included, however, in the index of the volume edited by Ritchie and Bhatia (1996), referring to the chapter there by McLaughlin and Heredia (1996), quoted in n. 12 of this chapter, who use “incidental” and “intentional” in their methodological senses.
 - 9 Schmidt (1994b, p. 173) acknowledges the importance that many L2 learners themselves attribute to the incidental learning of grammar rules, but dismisses incidental learning as a viable construct in the explanation of grammar acquisition.
 - 10 A vocabulary item is commonly conceived of as the connection between one or more meanings and a phonological and orthographic form. Of course, a vocabulary item is much more than that. It bears, for instance, grammatical information which may be involved in highly abstract principles of grammar. It is now common to say that grammar acquisition takes place through the lexicon (Bates and Goodman, 1997; Gass, 1999).
 - 11 The main finding of this study was that while “both instructional treatments were equally successful in facilitating the acquisition of relativization and both were more successful than the control treatment, the meaning-oriented treatment was shown to better facilitate comprehension than was the case in either the rule-oriented or control conditions” (Doughty, 1991, p. 463). The researcher attributed this difference to “the apparently successful combination of a focus on meaning and the bringing to prominence of the linguistic properties of relativization in the meaning-oriented group” (p. 463).
 - 12 McLaughlin published, in 1965, a review on incidental and intentional learning and devoted much of his later work to L2 learning – his 1987 book was a classic for a decade or so. Interestingly, it is McLaughlin who dismisses the notions of incidental and intentional as outdated in a recent publication (McLaughlin and Heredia, 1996, pp. 221–2): “Years ago, a . . . discussion took place over the question of whether it was legitimate to distinguish two types of learning – intentional and incidental. . . . Data from research show quantitative differences between the instructions and no-instructions groups, but all that can be concluded on the basis of such data is that learning is more difficult under disadvantageous (no-instructions) conditions. . . . there is no justification for the implication that two qualitatively distinct types of learning are involved (McLaughlin, 1965).”
 - 13 For an attempt to give a unified account of both the *what* and *how* of L2 learning, see Hulstijn (2002).
 - 14 Connectionists and symbolists have different views on the *what* of language learning. According to

- connectionists, language learners learn associations between units (in very complex configurations); according to symbolists, language learners internalize abstract principles and rules of grammar (apart from relatively simple constellations of declarative knowledge, such as vocabulary items and spelling rules). For connectionists, there is no reason to make a principled distinction between the *what* and *how* of processing, and hence between the *what* and *how* of learning. Connectionists speak of rule-like rather than of rule-governed behavior (see Ellis, this volume). Symbolists, however, see language use as the (automatic, unconscious) application of rules. Within the symbolic camp, however, there are different conceptions of the mechanisms through which symbolic knowledge representations come into existence. It is because of these underlying differences between connectionists and symbolists as well as among symbolists that interpretations of implicit and incidental learning differ widely (see Hulstijn, 2002).
- 15 In principle, it is possible for an L2 learner to follow up on L2 reading activities by activities of intentional learning, for example by rehearsing words encountered in a text, looked up in a dictionary, and written down in a notebook.
- 16 A detailed discussion of these pedagogical issues is beyond the scope of the present chapter, which is devoted to incidental and intentional learning rather than to the merits of various vocabulary-learning techniques. A more detailed account of the debate on the educational pros and cons of incidental and intentional vocabulary learning is given in Hulstijn (2001).
- 17 Thirty years later, one would find this classification rather questionable. But a criticism of the classification is irrelevant in the present context.
- 18 A nice illustration of how difficult it is to control participants' information processing can be found in the study by Eagle (1967). Two groups of participants in a vocabulary-learning experiment were instructed to use two different learning strategies, rehearsal and associative organization. After the administration of the retention test, participants were asked to report what learning strategies they had used. Neutral judges classified the reports into the categories of rote rehearsal, associate organization, or both. It was found that participants in the rehearsal group had actually learned more than half of the words with an associative strategy and that participants in the associative group had learned almost half of the words with a rote rehearsal strategy.
- 19 Section 5.2 makes some methodological points on studies limited to short-term retention.
- 20 For a discussion of educational implications see Hulstijn (2001).
- 21 A study by Feldman and Healy (1998) also suggests that L2 learners avoid learning L2 words with unfamiliar sounds or sound patterns. This study, however, was not designed as an incidental or intentional learning experiment.
- 22 This method is derived from, but not identical to, the one applied by Shu, Anderson, and Zhang (1995).
- 23 Avila and Sadoski (1996), however, obtained superior results for the keyword method even with delayed post-testing.

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