

TACIT KNOWLEDGE AND LANGUAGE LEARNING IN CHILDREN AND ADULTS AFTER *PERSONAL KNOWLEDGE* BY MICHAEL POLANYI

JUDITH ROSENHOUSE

Swantech – Sound Waves Analysis and Technologies, Ltd
Swantech@013.net.il

ABSTRACT

This paper examines tacit knowledge to which a considerable part of the book *Personal Knowledge* (Polanyi 1958) is dedicated.¹ We briefly review the main points in his discussion of this issue in this book and in his later *The Tacit Dimension* (Polanyi 1966), including his opinion about language in this framework. The next sections survey recent literature on language learning in children and adults and discuss the similarities and differences between Polanyi's views and modern approaches to it.

We conclude that, as in Polanyi's 1958 book, no well-defined cut-point separating implicit from explicit learning was found and they often appear to be balanced. New kinds of tacit knowledge have been defined and investigated, which Polanyi did not refer to.

Due to the wealth of details and domains in which tacit knowledge functions, Polanyi's analysis of the tacit was very influential. It may also be considered introductory. Tacit learning and knowledge is inherent to the human mind. It is one of the ways used by the human brain since infancy, and it grows and changes in nature and achievements during one's lifetime. This generalization is valid also to the learning and knowledge of human language which Polanyi did not investigate experimentally.

1. INTRODUCTION: M. POLANYI AND TACIT KNOWLEDGE

The understanding of 'tacit knowledge' has developed during the five decades since the appearance of *Personal Knowledge: Towards a Post-Critical Philosophy* (Polanyi 1958), not the least as a result of this book. Polanyi's goal in the book *Personal Knowledge* was to present a vision of human life and reality in which the tacit is an inherent part of life, and not only reason or un-expressible belief (Scott and Moleski 2005).

The terms 'tacit knowledge' and 'tacit learning' are not Polanyi's invention and previous studies referred to this issue (as Polanyi himself mentions them, and see Reber 1993:10-13). But Polanyi's philosophical rather than psychological approach "influenced the early grammar learning studies" (Reber 1993:12).

¹ Though Polanyi probably distinguished between knowing and knowledge in his book, we do not discuss the differences between them but use them interchangeably.

After a brief review of the main points about this issue in *Personal Knowledge*, and in the later book *The Tacit Dimension* (Polanyi 1966), we summarize language learning as Polanyi sees it in these two books. We then divert to mention some examples of recent and relevant literature from psycholinguistic angles of language acquisition and learning focusing on studies of children and adults' first and second languages. To conclude we compare the similarities and differences between Polanyi's views and more recent approaches to this subject.

2. TACIT KNOWLEDGE IN *PERSONAL KNOWLEDGE* (1958) AND *TACIT DIMENSION* (1966)

Polanyi dedicates the whole of part II in his book to 'the tacit component'. Chapter 5 Articulation (in Polanyi 1958) comprises twelve sections:

1. Introduction
2. Inarticulate intelligence
3. Operational principles of language
4. The powers of articulate thought
5. Thought and speech. I. Text and meaning
6. Forms of tacit assent
7. Thought and speech. II. Conceptual decisions
8. The educated mind
9. The re-interpretation of language
10. Understanding logical operations
11. Introduction to problem solving
12. Mathematical heuristics

Even these titles show that tacit knowledge is not limited to language, but as Polanyi thinks, it is a basic skill that activates all human considerations and actions. Tacit knowledge is especially important for mathematics and sciences according to Polanyi, with his scientific background, for he dedicates to them several sections in this book (and elsewhere). Tacit knowledge is in fact 'inarticulate intelligence', which exists also in animals where, however, it does not reach articulate intelligence, i.e., man's language skills. Among the animals which possess such intelligence Polanyi mentions apes, mice, and even human infants. However, Polanyi considers the tacit as "co-operating with the explicit, the personal with the formal" (Polanyi 1958: 87).

Polanyi considers three main kinds of human utterances: expression of feelings, appeals to other persons, and statement of facts. But his discussion of tacit knowledge is limited to "the indicative forms of speech as used for statements of fact" (Polanyi 1958: 77).

'Tacit knowing', as Polanyi writes, is the first of the three lecture series (The Terry Lectures, from 1962) which are collected in this book (Polanyi 1966). In his introduction

to this book Polanyi mentions that his ideas about this issue first rose in 1946 and were developed in the book *Personal Knowledge* (Polanyi 1958). His work on the 'tacit' went on and was published in *The Tacit Dimension* (Polanyi 1966), which he called an 'interim report'. Although we refer to this book as a unit in itself, the main line of thoughts – at least concerning language – does not reveal much change, in our opinion, from *Personal Knowledge*.

The main point is the fact that “we can know more than we can tell” (Polanyi 1966: 4) and this is what is called ‘tacit knowledge’. As in *Personal Knowledge*, the author gives in *The Tacit Dimension* many examples from daily life showing this to be an extremely common and daily phenomenon. The examples also bring out the distinction between ‘knowing what’ and ‘knowing how’ (following G. Ryle).

Polanyi sees the “basic structure of tacit knowing in two kinds of things”, or “two terms of tacit knowing” (Polanyi 1966: 9). By relying on awareness of the first term it is possible to attend to the second term (Polanyi 1966: 10). These two terms can also be seen as distal and proximal (Polanyi 1966: 11) “we are aware of that from which we are attending to another thing, in the appearance of that thing” (Polanyi 1966: 11). This relationship yields the meaning of the phenomenon – the semantic aspect of tacit knowing:

Since tacit knowing establishes a meaningful relation between two terms we may identify it with the understanding of the comprehensive entity which these two terms jointly constitute (Polanyi 1966: 13).

Getting a meaning first requires perception and observation of the perceived thing, which is tacit knowing, writes Polanyi. He then connects learning to feel with interiorization: “To rely on a theory for understanding nature is to interiorize it” (Polanyi 1966: 17) and adds: “The identification of tacit knowing with indwelling involves a shift of emphasis in our conception of tacit knowing” (Polanyi 1966: 17).

This idea continues thus:

...if we now regard the integration of particulars as an interiorization... it now becomes a means of making certain things function as the proximal term of tacit knowing, so that instead of observing them in themselves we may be aware of them in their bearing on the comprehensive entity which they constitute. It brings home to us that it is not by looking at things but by dwelling in them that we understand their joint meaning (Polanyi 1966: 18).

Dwelling on the details of the thing learnt tacitly may ruin the global picture, but the tacit knowledge of that object can often be recovered, and even improved, though not often exactly brought back to its first meaning. Polanyi even demonstrates tacit learning by an example from science itself:

A mathematical theory can be constructed only by relying on prior tacit knowing which consists in our attending from it to the previously established experience on which it bears. Thus, the ideal of a comprehensive mathematical theory of experience, which would eliminate all tacit knowing, is proved to be self contradictory and logically unsound (Polanyi 1966: 21).

His main conclusions are:

Tacit knowing is shown to account (1) for a valid knowledge of a problem (2) for the scientist's capacity to pursue it, guided by his sense of approaching its solution, and (3) for a valid anticipation of the yet indeterminate implications of the discovery arrived at in the end (Polanyi 1966: 24).

Such commitments are necessarily involved in any act of knowing based on indwelling (interiorizing particulars to which one does not attend) further relying on one's attending from these particulars "to a comprehensive entity connecting them in a way we cannot define" (Polanyi 1966: 24).

3. LANGUAGE LEARNING IN *PERSONAL KNOWLEDGE*

Several sections in *Chapter 5 Articulation* deal with language, as mentioned. From this part in *Personal Knowledge* we deduce that in Polanyi's view language learning and knowledge is but an example in the framework of his discussion of knowledge in general and 'the tacit' in particular. Several sections in this context refer to language, but it is easy to see that not language is his main target.

Polanyi describes language mainly as 'Langue', and not 'langage', using the terms of de Saussure (1956), i.e., the abstract or generalized faculty (or skill) rather than the real samples produced by people. When Polanyi describes the process of a child learning to speak (Polanyi 1958: 106-107) he deals with the *manner* but not the *stages* of language acquisition. He mentions the mistakes a small child does in trying to understand the world around her, for according to Polanyi such mistakes exist also later in adults' behavior when they do not understand a new word. He notes that scholars trying to understand Greek terms "their guesses are guided by criteria of *fitness* similar to those on which the child relies in its fumbblings to understand speech" (Polanyi 1958: 107).

Further on Polanyi discusses the way one resolves an incompatibility that may come up between a text and its meaning. In such a case, he writes,

we must choose whether to (1) (a) Correct the meaning of the text, (b) re-interpret the text, (2) Re-interpret experience, or (3) Dismiss the text as meaningless. Case (1a) is now seen to cover both the receptive process by which we improve our knowledge of

a language and the elimination of verbal puzzles by a stricter control of language, as practiced by modern philosophy. Combinations of (1b) and (2) are exemplified by conceptual discoveries in science... The dismissal of a text as meaningless and of the problem raised by it as a pseudo-problem (Case (3)) may result from the philosophic clarification of its terms (Case 1(a)). (Polanyi 1958: 108).

This leads to the re-assertion of the principle that governs 'questions of nomenclature,' for language is continuously reinterpreted in everyday use. He writes thus:

In this changing world our anticipatory powers have always to deal with a somewhat unprecedented situation, and they can do so in general only by undergoing some measure of adaptation. More particularly: since every occasion on which a word is used is in some degree different from every previous occasion, we should expect that the meaning of a word will be modified in some degree on every such occasion (Polanyi 1958: 110).

Such a description is very much in line with the early discussions of the *signifiant-signifié* issue by de Saussure (1959/1964) and others. But this point of view, leads Polanyi to state that meaning changes often occur *tacitly* by people agreeing tacitly on new meanings of words which were not previously defined in that manner (Polanyi 1958: 110-111). At this point we may add that later on linguists viewed meaning changes as related to their linguistic and extra-linguistic context (e.g., Lyons, 1977), and thus meaning and its changes and language development are not really 'mysterious' indefinable 'tacit' notions.

4. TACIT LEARNING IN PSYCHOLOGY

Philosophers with psychological tendencies (and Polanyi is among them) understood that human beings are not acting and thinking only logically. That is probably how 'the tacit' has become a topic of discussion for philosophers as well as psychologists and in due course also for researchers in several other disciplines of science. Tacit learning is now studied in various branches of psychology, including cognitive psychology and psycholinguistics. In this section we review a few publications which represent different approaches to this matter as introduction to studies in language acquisition and learning.

Basic cognitive processes involve attention, perception and memory. Thinking has been defined as a cognitive process involving the use of symbols which represent the excitation (but not the excitations themselves). Thinking has therefore a large variety of functions (Arnon 1985: 1).

Learning is one of the processes of thinking, and as such it constitutes one of the domains of psychological investigating. In Ziv (1996: 129-132), for example, tacit

learning, also named *implicit learning*, is described as part of cognitive learning, which includes learning patterns, insight, tacit, and imitative learning.

It has been found, for example, that tacit learning is enhanced when the tested person (the subject) receives certain rewards (Ziv 1996: 130), which links it with other cognitive and psychological (e.g., emotional) factors. Thinking processes involve graded cognitive level development, which begins with attention and perception, continues with memory and finally with processes of the acquisition of notions, planning, problem solving and deduction (Arnon 1985: 2).

At about the middle of the 20th century the effect of behaviorist theories began to diminish and psychological studies diverted, among others, to the study of theories of mind (cognitive studies) and information processing. MacWhinney (1997) thinks that these trends are based on new theoretical and experimental methodologies which have made some progress. Such a theory is the connectionist model which links explicit to implicit learning. We delineate some of these approaches below.

Reber (1993) develops the subject of tacit learning and tacit knowledge on the basis of experimental studies. In this book Reber (like MacWhinney) explains that psychology diverted from theories of learning to cognitive studies. Reber (1965) renamed 'tacit learning' study as 'implicit learning'. Note that this 1965 study (Reber's PhD dissertation) is dated one year before Polanyi's *Tacit Dimension*, but after Polanyi (1958). Reber writes in his 1993 book the following: "One of the core assumptions of our work has been that implicit learning is a fundamental 'root' process, one that lies at the very heart of the adaptive behavioral repertoire of every complex organism" (Reber 1993: 5). Reber also writes (Reber 1993: 7) that his work in tacit learning and tacit knowledge focuses on considerations of evolution which have built consciousness and conscious control over action and deeper and more primitive processes. This approach is supported by the fact that tacit learning and knowledge show more robustness and resilience to disruptions due to neurological insult and clinical disorders, like many of the older and more primitive functions. He also notes (Reber 1993: 24) that there is no well-defined cut-point or threshold separating implicit and explicit learning at some point along a continuum: the issue is, in his opinion, the balance between them and not the exclusion of one for the benefit of the other.²

Reber (1993) further mentions the existence of views that do not consider implicit learning as anything significant, but consider it "a failure to probe effectively the subjects' ability to explicate their knowledge" (Reber 1993: 25). Such claims directly derive from the stance that consciousness is primary and unconscious implicit functions are derived from conscious processes. Reber's approach is quite the opposite, namely, that the implicit is primary, but due to the functionalism principle, normal human behavior is a delicate blend of the conscious and the unconscious, whereas sometimes there are cases when one of them takes the lead over the other.

² A similar idea appears already in Polanyi (1958: 87). See above, section 2.

Pinker (1997) describes the functioning of the human mind, including learning. Pinker does not explicitly mention tacit/implicit knowledge or learning, but is in fact dealing with it. For example, by analyzing difficulties of constructing an artificial mind, i.e., robots, he discusses one by one various aspects of the human mind, some of which involve tacit learning and knowledge – which robots lack. His tome thus integrates results of many recent studies of brain structure and its functioning.

A major condition for learning, according to Pinker (1997), is perception.³ After examining the features involved in ‘consciousness’ (intelligence, self knowledge, access to information, and sentience) Pinker claims that “consciousness is access”. Once there is access to some kind of information, by sight, hearing or any other sense, it can be taken in, adapted and processed for human needs. Consciousness, in his opinion, can thus be studied and explained as a ‘problem’, not an unsolvable ‘mystery’ (this distinction is discussed in the first part of Pinker 1997)⁴.

In another, more recent book (Pinker 2002) human nature is discussed from the point of view of hereditary genetics vs. learned social behavior. In Chapter 4 (Pinker 2002: 76-78 in the Hebrew translation) this author summarizes the fact (as has been previously often described) that learning in the human culture involves a soul that is equipped with a device that enables the individual to read the intentions of other individuals. This is called “intuitive psychology, folk psychology or theory of the soul”, adds Pinker. Pinker further claims (Pinker 2002: Chapter 13) that our multifaceted cognitive features are based on a central intuition which was adequate for the analysis of the world at the time in which our evolution existed. He enumerates a few cognitive features and the central intuitions on which they are based: intuitive physics, biology or natural wisdom intuition, intuitive engineering, intuitive psychology, special sense, numerical sense, probability sense, intuitive economics, mental database and logics, and language. Among these we note intuitive psychology and language. We assume that these two areas at least partly refer to what for Polanyi was ‘tacit knowledge’.

It is interesting to note that tacit learning and knowledge are considerably popular not only with psychology and philosophy, but also with industrial management research. This field may be considered applied psychology for its aim by using psychological methods is to manage people and increase their productivity. Nonaka and Takeuchi (1995), for example, aim at developing the creation of knowledge as a major factor in industrial competitiveness. The authors view the interactive processes between tacit and implicit knowledge and the individual and the

³ Polanyi realized also this observation, though he described it in different terms. See section 2 above.

⁴ Pinker also reminds the readers of the fact that certain physical levels of functioning remain unconscious, such as the secretion and functioning of enzymes or blood flow, which cannot be consciously „activated” or „changed”. We should note the difference between these physical activities that enable the human body’s life and the unconscious knowledge which affects human behavior as understood in the term „tacit knowledge”.

organization in four processes: (1) from tacit to explicit, (2) from explicit to explicit; (3) from explicit to tacit; and (4) from tacit to tacit (Nonaka and Takeuchi 1995: ix and see especially Chapter 3 and 4). Later studies (such as Maskell and Malmberg 1999, Gupta, Iyer Lakshmi and Aronson 2000, Bloodgood and Salisbury 2001, Ambrosini and Bowman 2001, Castello 2002, Gertler 2003, Hall and Andriani 2003), although in part still debating the notion and its meaning, take ‘tacit knowledge’ more or less as granted and lead it to further practical applications in industrial management.⁵

5. TACIT LANGUAGE LEARNING IN CHILDREN AND ADULTS ACCORDING TO RECENT LITERATURE

In this section we survey work on the tacit in adult and child language learning and acquisition from various linguistic angles (grammar rules, vocabulary), languages and genres. These studies can be classified under psycholinguistics, neurolinguistics and applied linguistics.⁶

Pinker (1997) refers to the ‘combinatorics of mentalese’ of human thought and action, including language:

A few elements and a few rules that combine them can generate an unfathomable vast number of different representations, because the number of possible representations grows exponentially with their size (Pinker 1997: 88).

This fact has already been realized at least since the beginning of the 20th century, but we repeat it because its importance in the context of children’s tacit language learning⁷.

Language learning / acquisition has been widely studied over the years, in particular since the middle of the 20th century. In this period language skills have been separated into the study of first language vs. second (or other or foreign) language. In parallel, it has been split into learning and acquisition, firstly by Krashen (e.g., 1981). Krashen distinguished between an unconscious process of abstraction called ‘acquisition’ and a conscious process called ‘learning’. Thus, ‘acquisition’ is achieved in an individual’s first language (i.e., the child’s mother tongue) whereas

⁵ I am told that most recent methods in industrial management use different methods for this issue, but it is beyond this paper to treat this issue.

⁶ From the vast literature of child language development we refer here only to a handful of works.

⁷ Language learning in children is discussed in Pinker (1997), e.g., in the section “Connectoplasm” (112-131), which is related to the theory of “connectionism”. The learning theory called Connectionism is also the topic of Bates and Elman (2001).

'learning' describes the process of learning the second or any other language under controlled conditions, e.g., at school.

This view has been debated, for various similar features have been found between a child's first language acquisition and the learning/acquisition of the second / foreign language by children as well as adults. Such similarity is seen in the fact that language understanding precedes language production.

Krashen himself found, however, that consciously learned linguistic knowledge was limited to easy rules and could account only for a small part of the knowledge of a second/foreign language (and was therefore of limited usefulness). Thus, also most second language acquisition, according to Krashen, was due to unconscious (implicit) processes and similar in this respect to first language acquisition.⁸

Schmidt (1990, 1993, quoted in Robinson 1997b: 225) distinguished three senses of "unconscious learning: (a) learning without awareness; (b) learning without intention, and (c) learning without explicit meta-linguistic knowledge of what has been learned".⁹ Schmidt therefore argued that learning without noticing was impossible. Other studies revealed interaction between rule complexity and learning (see review in Robinson 1997a).

Robinson (1997a) studied the performance of adult learners of English as a foreign language under four conditions of learning: implicit, incidental, enhanced and instructed learning.¹⁰ Three conditions motivated three lines of psychological research: (a) the relative effectiveness of learning under conditions with a conscious focus on form versus learning in conditions with no focus on form; (b) the development of automaticity in learning as a function of exposure to multiple instances of input; and (c) the debate over whether decision making processes operating on the knowledge bases established by learning in each condition and reflected in the transfer grammaticality judgment task are memory based or rule based.

Robinson's participants were tested under the above four conditions, with the task of trying to learn two new grammatical rules, an easy one and a difficult one. Robinson's analysis included consideration of aptitude, strategies using memory and explicit and implicit learning.

In that paper the author finds no evidence that learning in the Incidental condition is superior to Instructed learning of the difficult rule. But only in the Incidental condition was the extent of learning and awareness unrelated to individual differences in aptitude. Awareness at the level of Noticing did not accompany superior learning in any condition, but at the level of looking for Rules, awareness accompanied

⁸ Furthermore, it has been shown that in second/other language learning learners use previous linguistic knowledge (of, e.g., phonological and grammatical notions) from their first language (see Rivers 1983: 159-161, Navracics 2002).

⁹ Polanyi (1958) does not make this sub-categorization.

¹⁰ Note that he distinguishes between „implicit" and „incidental" which in various other studies have been used apparently as synonymous.

superior learning for Implicit learners. At the level of Ability to Verbalize, awareness accompanied superior learning for both Implicit and Rule-search learners.

The questionnaire results provide no support for the claim that the learning that occurs after training in the Implicit and Incidental conditions is the result of unconscious processes. Noticing in itself did not lead to successful learning in any condition, but awareness at the level of Looking for Rules and Ability to Verbalize predicted superior learning of both rules for Implicit participants. Conscious awareness therefore facilitated successful learning in this (Implicit) condition. Successful learning of easy rules was also associated with awareness at the level of Ability to Verbalize for participants in the Rule-search condition, though successful learning of difficult rules was not related to it. All this suggests, similar to Reber (1989, 1993), that rule search is probably a less successful strategy where the stimulus domain is complex. Robinson went on to hedge this conclusion and pointed at possible individual differences between participants as source of these results. Successful learning by Incidental participants showed no significant correlation with aptitude, and successful learning for this group alone was independent of awareness. Other aspects of the same issue (learning processes) are studied in Robinson (1997b).

Child language acquisition and learning before school-age is clearly only tacitly operated for it does not involve a conscious explicit process. C.A. Nelson (2002) investigates the operation of memory mainly in infants, and compares them with older children and with adults. Nelson's starting point is the observation that human (adult) memory shows an explicit and an implicit memory, which are related to explicit and tacit learning, which is our present topic. Nelson's survey of the literature reveals a distinction between the development and functioning of the cortical (TE region) and the inner brain parts (hippocampus, amygdala, and other areas). Nelson concludes that the processes developed earlier are more related to the cerebellar parts of the brain (its older and internal area), while later processes involve the cortex (i.e., more recent and external brain parts) and gradual reshaping of the functions of various previously-developed brain parts, since adult memory involves more than these two functions (it also employs, e.g., procedural and working memory). Thus, from the evolutionary point of view, implicit memory functions apparently develop earlier than explicit memory.

Rice (1990) referred to the apparent ease and immense quantity of words that children acquire in pre-school age (3–5 years old). We mention this study because Rice studied this issue and named it QUIL that is, 'quick incidental learning', which is equivalent, in fact, to tacit learning. In this line Nagy and Herman (1987) claim that about a third of children's vocabulary at kindergarten age is due to tacit listening to stories at the kindergarten.

Another study (Kehat 2004) deals directly with tacit / incidental learning of vocabulary in older children. This MA thesis in psycholinguistics investigates the learning of vocabulary in 5th and 6th grade students whose mother tongue is either

Hebrew or Russian. These children were tested in learning English (as a second or foreign language) in Israel. The results proved that children could learn at least some foreign language vocabulary items just by listening to stories read aloud by the teacher, with or without glosses added in the text which they were simultaneously following in silent reading. This study also shows for us that interest in this topic is still continuing.

The research by Dakwar-Khamis (1999) relates to the acquisition of VSO and SVO sentence structures¹¹ in very young children (age range: 1;7-3;0 years) who are native speakers of (colloquial) Arabic in Israel. At this age only tacit learning can apply, of course, and the study shows that children in those ages learn gradually how to create and use these two sentence structures. This study is noted here because of its theoretical approach, namely, the generative grammar framework it uses for analyzing the findings.

Using modern methodologies that differ from the above researches (e.g., measuring brain wave functions), Ari-Even Roth, Kishon-Rabin, Hildesheimer and Karni (2005) and Korman, Doyon, Doljansky, Carrier, Dagan and Karni (2007) present in their recent papers tacit learning of different tasks. In the studies the subjects were tested as to motor skills (Korman et al. 2007) and to auditory (speech sounds) identification skills (Ari-Even Roth et al. 2005), a few hours following the learning phase and after a night's sleep, as well as a few weeks after this testing. The effect of sleep has proved influential in Korman et al.'s (2007) research, i.e., in motor skills, but it was not necessary or not effective in Ari-Even Roth et al.'s (2005) study. This kind of studies shows tacit learning processes in the brain.

Katherine Nelson (1996) thinks that language acquisition has been neglected in psychological studies because of the inheritance of Piaget's theory, and cognition studies have considered language independently of any effects on cognition, in spite of its central position in human development. K. Nelson stresses that language acquisition rests on "prior nonlinguistic perceptual, conceptual and social-communicative processes" (Nelson 1996: 4) and that it involves cognitive individual development in time. Her approach is thus *experiential*, and considers the participatory interactions a child has within a social group, in which s/he has to make sense of her/his place in the world (Nelson 1996: 4-5). Language enables children to name and refer to things, objects and feelings, and thus to share concepts with others. Implicit learning or knowledge is found in children's plays where they collaborate to fulfill plans or scripts tacitly learnt and create their world; later in life they thus learn cultural systems including communicative roles and manners (Nelson 1996: 340 ff.).

Tomasello (2003) is similar in this respect to Nelson's approach. In this book Tomasello describes first language acquisition processes and learning theories (associative learning; constraints and principles; social-pragmatic theory – see

¹¹ V= verb, S=subject, O=object

mainly Tomasello 2003: 82-95) and his preferred usage-based functional theory (in particular, Tomasello 2003: 323-328). Tomasello (2003) considers the fact that child language acquisition develops gradually, beginning when it does in the manner that it does, as the reflection of additional developmental and cognitive factors, including eye-contact, attention to the adult's gaze, the environment, etc. This approach is in line with the conclusions in Nelson (2002) and Nelson (1996, 2007).

Based on the vast literature of child language acquisition, Tomasello claims that children's language learning is "not a logical problem but an empirical problem" (Tomasello 2003: 328). We quote:

The current usage-based theory... claims that children and adults have access to their hierarchy of linguistic constructions at several levels of abstraction simultaneously. This means that in many cases children's comprehension and production of relatively complex utterances are based on a simple retrieval of stored expressions, whereas in other cases they are based on the cutting and parsing together of stored linguistic schemas and constructions of various kinds and degrees of abstraction. This would seem to be the way that people master a variety of cognitive skills, and there is no reason to think that language is any different in this regard. Importantly, when we focus in this way on language use and usage-based operations, we must perforce invoke in our acquisition theory a variety of cognitive and social-cognitive processes that originate from outside the domain of language per se (perception, memory, joint attention, intention reading, categorization, analogy and so on) (Tomasello 2003: 327-328).

Reviewing such studies demonstrates the interest of language acquisition/teaching researchers in implicit learning, also for its applicative goals in (adult, second) language learning.

Another recent study is Antonietti et al. (2006a), which presents several chapters related to the relation between mind and language. Among these chapters, the study and use of mental verbs (e.g., 'hope' or 'remember') in a second/foreign language is studied in school children, university students and older adults. One of the features of the understanding and use of such verbs is that they require mental-cognitive functioning which differs in certain respects between different cultures and languages (see Antonietti et al. 2006b, and Olson et al. 2006). Thus, it emerges that implicit learning is not only language-dependent and task-dependent but also culture-dependent.

Another area which proves the importance of tacit learning is where it is lacking. Such a case is that of hearing impaired children, who cannot acquire tacitly many aspects of human oral communication due to their impairment. Such children need to learn everything explicitly and intentionally, especially language. The lack of tacit learning is evident in the case of idioms and metaphors, which for hearing impaired children form specific learning subjects. A recent example is the new syllabus for

hearing impaired children in Israel (see Moores and Martin 2006, Stern and Sandberg 2008). Similar problems exist with blind children.

The surveyed publications show a wealth of cognitive, neurocognitive and linguistic information that has been collected in the last five decades concerning the tacit, alias implicit, alias incidental learning. Polanyi's earlier analysis of the differences between explicit and tacit learning are proved right in principle, but rather pale in comparison with recent findings.

6. DISCUSSION AND CONCLUSION: COMPARISON OF POLANYI (1958) AND LATER LITERATURE ABOUT TACIT LANGUAGE LEARNING AND KNOWLEDGE

Since Polanyi (1958), studies of tacit learning / tacit knowledge have assumed many diverse philosophical, psychological, cognitive, neurological, biological, linguistic and applied approaches. Among the topics that developed along the years, was the distinction between conscious and unconscious functions of the brain. Recent brain research has shown that the brain develops in an individual's lifetime also in this respect (Nelson 2002). The question of how tacit knowledge and learning functions, which Polanyi looked at, is thus heading toward some physiological answers.

Some studies we referred to aim at expanding knowledge in large populations by tacit methods. Such works involve industrial companies and large research groups whose models have become widespread in industrial circles. Their recent efforts deal not only with understanding the tacit, but also with *transforming* tacit into explicit learning, the explicit into tacit, and the interactions between them (e.g., Nonaka and Takeuchi, 1995).

Schmidt (as quoted in Robinson, 1997a) distinguished three senses of "unconscious learning": (a) learning without awareness; (b) learning without intention, and (c) learning without explicit meta-linguistic knowledge of what has been learned. These categories, which were not mentioned in Polanyi's 'tacit learning', enabled further analysis of the learning processes involved in the 'tacit'.

Basing his conclusions on experimental investigations, Reber (1993) finds that there is no well-defined cut-point or threshold separating implicit and explicit learning at a definite point along a continuum: the issue is, in his opinion, the balance between them and not the exclusion of one for the benefit of the other. A similar idea appears already in Polanyi (1958: 87). Reber's studies treat psycho-linguistic aspects of the tacit, however, whereas Polanyi analyzes not only language but also many other domains (scientific proofs, motor skills, etc.) under the framework of tacit knowing and knowledge.

Based on the literature we referred to above (probably a drop in the sea) we can (tacitly) conclude that tacit learning is inherent to the human mind as one of the manners by which the brain functions since infancy. The dichotomy between implicit and explicit learning /knowledge does not disappear but continues while

changing its nature and achievements. Since tacit and explicit knowledge do not operate separately, as has been found, researchers need much ingenuity to disentangle their overlapping in order to resolve unsolved research questions.

Concerning the tacit in language learning we have seen that in 1st language acquisition understanding precedes production, as in various aspects of 2nd language acquisition, learning and use in children and adults. This basic language understanding implies tacit learning.

We do not think that Polanyi had in mind this kind of development to follow the ideas he presented in his famous book. But he would probably have been happy to know that his ideas go such a long way, because he believed that ‘tacit learning/knowledge’ had great importance in diverse cultural settings and topics. The last word in tacit learning/knowledge has not yet been said, for the brain still poses for its researchers many difficulties and unsolved questions. So the various aspects of tacit learning/ knowing/ knowledge also called implicit learning, incidental learning, unconscious awareness, etc., are still apparently to remain a research topic for a long time.*

* An earlier version of this paper was read at the conference Reconsidering Polanyi, Budapest, June 2008.

BIBLIOGRAPHY

- Ambrosini, V. and C. Bowman (2001) “Tacit knowledge: some systems for operationalization.” *Journal of Management Studies*, 38(6): 811-829.
- Antonietti, A.; Liverta-Sempio, O. and A. Marchetti (eds. 2006a) *Theory of Mind and Language in Developmental Contexts*. New York: Springer
- Antonietti, A., Liverta-Sempio, O., Marchetti, A. and J.W. Astington (2006b) “Mental language and understanding of epistemic and emotional mental states: contextual aspects.” In Antonietti et al. (eds.) *Theory of Mind and Language in Developmental Contexts*. New York: Springer, 1-30.
- Ari-Even Roth, D., L. Kishon-Rabin, M. Hildesheimer and A. Karni (2005) “A latent consolidation phase in auditory identification learning: Time in the awake state is sufficient.” *Learning & Memory*, 12:159-164.
- Arnon, R. (1985) *Foundations of Cognitive Psychology. Unit 6, Logical and Natural Notions*. (ed. D. Zakay). Tel-Aviv: Everyman’s University.
- Bates, E. and J. L. Elman (2002) “Connectionism and the study of change.” In M.H. Johnson, Y. Munakata and R. O. Gilmore (eds.) *Brain Development and Cognition. A Reader*. Oxford, UK: Blackwell Publishers. 421-440.
- Bloodgood, J. M. and W. D. Salisbury (2001) “Understanding the influence of organizational change strategies on information technology and knowledge management strategies.” *Decision Support Systems*, 31(1): 55-69.
- Castello, J. (2002) “A note on the concept of tacit knowledge.” *Journal of Management Inquiry* 11(1): 46-57.

- Dakwar-Khamis, R. (1999) *Acquisition of SVO and VSO Sentence Structures in Palestinian Arabic Speaking Children*. Unpublished MA thesis, The University of Tel-Aviv.
- de Saussure, F. (1959) *Course in General Linguistics* (eds: Charles Bally and Albert Sechehaye in collaboration with Albert Reidlinger; translated from the French by Wade Baskin) London: P. Owen.
- Gertler, M.S. (2003) "Tacit knowledge and the economic geography of context or the undefinable tacitness of being (there)." *Journal of Economic Geography*, 3:75-99.
- Gupta, B., S. Iyer Lakshmi and J.E. Aronson (2000) "Knowledge management: Practices and Challenges." *Industrial Management and Data Systems*, 100(1): 17-21.
- Hall, R. and P. Andriani (2003) "Managing knowledge associated with innovations." *Journal of Business Research*, 56 (2): 145-152.
- Kehat, S. (2004) *Second language Vocabulary Acquisition in the Elementary School through Listening to Spoken Texts: The Effect of Word Frequency, Gloss and 'Lexical text Coverage'*. unpublished MA Thesis, The University of Haifa.
- Korman, M., J. Doyon, J. Doljansky, J. Carrier, Y. Dagan, and A. Karni (2007) "Daytime sleep condenses the time course of motor memory consolidation." *Nature Neuroscience*, 10:9, 1206.
- Krashen, S.D. (1981) *Second Language Acquisition and Second Language Learning*. Oxford: Pergamon Press.
- Lyons, J. (1977) *Semantics*, 2 vols. Cambridge: Cambridge University Press.
- MacWhinney, B. (1997) "Implicit and explicit processes." *Studies in Second Language Acquisition*, 19: 277-281
- Maskell, P. and A. Malmberg (1999) "Localised learning and industrial competitiveness." *Cambridge Journal of Economics*, 230: 167-185.
- Moores D.F. and D.S. Martin (2006) *Deaf Learners: Developments in Curriculum and Instruction*, Gallaudet University Press.
- Nagy, W. and Herman, P.A. (1987) "Breadth and depth of vocabulary knowledge: Implications for acquisition and instruction." In M.G Mckeown and M.E. Curtis (eds.) *The nature of vocabulary acquisition*. Hillsdale, NJ: Lawrence Erlbaum. 19-35.
- Navracscics, J. (2002) "Interview on bilingualism. Questions to Prof. F. Grosjeans." [Online], [Cited: 25. 7. 2008] Available from: http://www.francoisgrosjean.ch/interview_en.html
- Nelson, Katherine (1996) *Language in Cognitive Development: Emergence of the Mediated Mind*. Cambridge: Cambridge University Press.
- Nelson, Katherine (2007) *Young Minds in Social Worlds: Experience, Meaning and Memory*, Cambridge, Mass.: Harvard University Press
- Nelson, C.A. (2002) "The ontogeny of human memory: A cognitive neuroscience perspective" In M.H. Johnson, Y. Munakata and R. O. Gilmore (eds.) *Brain Development and Cognition. A Reader*. Oxford, UK: Blackwell Publishers. 421-440.
- Nonaka, I. and H., Takeuchi (1995) *The knowledge-creating company: How Japanese Companies Create the Dynamics of Information* New York: Oxford University Press.
- Olson, D.R., Antonietti, A., Liverta-Sempio, O. and A. Marchetti (2006) "The mental verbs in different conceptual domains and in different cultures." In Antonietti et al. (eds.) *Theory of Mind and Language in Developmental Contexts*. New York: Springer. 31-64.

- Pinker, S. (1997) *How the Mind Works*, New York and London: W.W. Norton & Co.
- Pinker, S. (2002) *The Blank Slate* (Hebrew translation: E. Lotem, scientific edition: H. Kreiner), Tel-Aviv: Triwaks Enterprises/Matar Publishing House.
- Polanyi, M. (1958) *Personal Knowledge. Towards a Post-Critical Philosophy*, London: Routledge and Kegan Paul.
- Polanyi, M. (1966) *The Tacit Dimension*, Garden City, New York: Doubleday & Company, Inc.
- Reber, A.S. (1965) *Implicit Learning of Artificial Grammars*. Unpublished MA thesis, Brown University.
- Reber, A.S. (1993) *Implicit Learning and Tacit Knowledge: An Essay on the Cognitive Unconscious*. New York, Oxford: Oxford University press and Clarendon press.
- Rice, M. L. (1990) "Preschoolers' QUIL: Quick Incidental Learning of Words." In: G. Conti-Ramsden and C.E. Snow (eds.) *Children's Language, Vol. 7*. Hillsdale, NJ: Erlbaum Associates. 171-195.
- Rivers, W.M. (1983) *Communicating Naturally in a Second Language: Theory and Practice in Language Teaching* Cambridge: Cambridge University Press.
- Robinson P. (1997a) "Individual Differences and the fundamental similarity of implicit and explicit adult second language learning." *Language Learning*, 47(1): 45-99.
- Robinson, P. (1997b) "Generalizability and automaticity of second language learning under implicit, incidental, enhanced and instructed conditions." *Studies in Second Language Acquisition*, 19: 223-247.
- Schmidt, R. (1990) "The role of consciousness in second language learning." *Applied Linguistics*, 11: 129-158.
- Schmidt, R. (1993) "Awareness and second language acquisition." *Annual Review of Applied Linguistics*, 13: 206-226.
- Scott W.T. and M. X. Moleski, S.J. (2005) *Michael Polanyi Scientist and Philosopher*, Oxford: Oxford University Press.
- Schmidt, R. (1995) "Consciousness and foreign language learning: A tutorial on the role of attention and awareness in learning." In: R. Schmidt (ed.) *Attention and Awareness in Foreign Language Learning*. (Technical Report No 9.) Honolulu HI: University of Hawaii, Second Language teaching and Curriculum Center. 1-65.
- Stern, H., S. Sandberg (2008) "Language policy in the education of hearing-impaired children in Israel." Talk presented at *Language Policy in Israel: The state of the art* conference, 28th of May, 2008, Ramat Gan: Language Policy Research Center, Bar Ilan University.
- Tomasello, M. (2003) *Constructing a Language. A Language-Based Theory of Language Acquisition*, Cambridge, Mass, USA London UK: Harvard University Press
- Ziv, A. (1997) *Psychology – The Science of Understanding Human Beings*, Tel-Aviv: Am Oved Publishers Ltd. (in Hebrew).