What has research in the past decade taught us about the relationship between children's acquisition of language skills and their conceptual development?

Henna Lemetyinen, a specialist in language acquisition, takes on the view that "language is a cognition that truly makes us human".[1] The acquisition of language is a skill which differentiates humans from any other species, by expressing infinite ideas through a limited set of noises. The process of early word learning requires the crucial connection between both linguistic and conceptual development, and over the past decade, research into psychology has taught us that learning a new word involves the child identifying a conceptual unit, identifying a linguistic unit, and establishing a very specific relationship between them. For the conceptual unit, the child has to not only establish the correct part of the aspect being labelled, but also isolate the idea at the correct grammatical position. For the linguistic side, the syntactic context in which the world appears must be used by the child to decide its grammatical category. In order to judge which idea the particular word singles out, the child must also use syntactic information and observations of the world including social-communicative cues. Recent evidence supports the impression that young children obtain new words quickly and extend them suitably. However, depending on the type of word being acquired, the amount and depth of observational and linguistic cues will vary, with a "priority of noun-learning over verb-learning"[2]

In recent years, the connection between language acquisition and conceptual development has been emphasized in research studies, revealing how this relationship unfolds from young childhood through to adulthood. By outlining two different metaphors, the child-as-data-analyst metaphor and the child-as-theorist metaphor, Waxman and Gelman (2009)[3] have supported work on the importance in coordination between linguistic and conceptual systems. The child-as-data-analyst metaphor, supported by David Rakison (2008)[4], captures the child's unique ability to notice mathematical consistencies in their surroundings and the strong sensory and perceptual properties that they bring to the task. The child-as-theorist metaphor, supported by Renee Baillargeon (2008)[5], captures infants' significant spread of conceptual capacities, including basic knowledge of physical objects, undeveloped theories of animate objects, and sensitivity to identify differences between the behaviour of both. These two metaphors do not compete with one another, but rather depend on each other, as children rely on both the statistics and the theories that they hold to develop language and understanding.

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1 Lemetyinen, H. (2012). Language Acquisition Theory - Simply Psychology.
2 Snedeker J, Gleitman L. (2004) Why it is hard to label our concepts. In: Hall, Waxman Weaving a Lexicon. Cambridge, MA: MIT Press.
3 Waxman S, Gelman S. (2009) Early word learning entails reference, not merely associations. Trends Cogn Sci
4 Rakison, Lupyan. (2008) Developing object concepts in infancy: An associative learning perspective. SRCD Monographs.
5 Baillargeon R. (2008) Innate ideas revisited: For a principle of persistence in infants' physical reasoning. Perspectives on Psychological Science.

Vladimir M Sloutsky (2003), a strong supporter of the *child-as-data-analyst* view, has taken a firm associationist approach to language acquisition and conceptual development.[6] He has suggested a theory that regards the simple association of ideas as the primary basis of meaning, thought, or learning. His work revolves around three dominating theories; the only sources for learning new words and concepts are through sensory and perceptual experiences, these experiences are organised strictly by "general-purpose processes" (such as associative learning and attention), and that deeper conceptual processes are pointless at this stage of development and understanding. The reactivity of children (regarding perceptual information) is highlighted through his research, however despite proposing different ideas, his work has not entirely ruled out the *child-as-theorist* model.

When a child acquires a language, they systematically begin to learn concepts. Supposing a child is using the word "ball," he may point to the object. However, this does not necessarily mean that the child has mastered the genuine definition of the word. He may begin by calling many objects a "ball" whilst putting them into groups. The child must then learn to extend this novel word beyond the particular situation in which it was initially introduced. Specifically, the child must be able to extend "ball" beyond the specific ball they were first exposed to, and eventually beyond all the balls they have ever seen, to the theoretical concept of a ball. Furthermore, many different words can be applied to the same scene. For example, when the ball is being thrown between two people, the child may hear "catch" or "throw". The child must then learn to discover the limit of the word's application, which involves coordination between the linguistic and conceptual systems. A child then will begin to increase their vocabulary and learn the correct terminology. This suggests that a child extends their understanding of the world through learning about words, and using them by trial and error to expand their understanding.

Research on early word learning has revealed a considerable amount about infants' and toddlers' linguistic and conceptual capacities, how they develop, and how they change over the course of their development. Until recently, research from psychologists such as Woodward and Markman (1998)[7], only focused on one type of word (nouns) and one type of concept (object categories). However, evidently nouns are not the only words that children acquire, and concepts of objects are not the only ones which they develop. Other words and concepts share equal importance through infancy, and moreover, noun identification may not be the greatest technique for general language acquisition. Nouns can be considered one of the most easy parts of speech, so this is a limited perspective

More recently, it has been made more obvious that learning different kinds of words will require different kinds of information, therefore the acquisition of other word types such as adjectives and verbs, cannot simply be an extension of simple noun learning. Abstract terms, such as words for time, present a significant problem for the infant learning to speak. Unlike words for objects, their categories are not easily observed or pictured, and referents cannot be pointed out for these sorts of words to help the child understand their meaning. Gleitman et al (2005) argue that

[6] Sloutsky VM. (2003) The role of similarity in the development of categorization. Trends in Cognitive Sciences.
[7] Woodward AL, Markman EM. (1998) Early word learning. In: Handbook of Child psychology: Cognition, perception and language: John Wiley,

words fall on a scale from concrete to abstract, with concrete terms being easier to learn than more abstract ones (i.e. verbs) for which meanings can be difficult to establish from context. [8]

Infants learning their very first words must begin with a strong conceptual starting point, however regardless of their conceptual awareness, vocabulary acquisition is not as simple as merely linking sounds to the correct category automatically. Hearing new words not only presents the infant with a range of new similarities among objects, but also a vast range of differences which may otherwise have gone unnoticed. Developmental research reveals that children are sensitive to this link as early as 6 months of age, and also indicates that this sensitivity is connected more specifically to words, rather than to general attention grabbing noises. In order to research this area more thoroughly, I decided to organise a simple experiment similar to that of Waxman and Markow (1995)[9], involving 16 to 24-month-old infants I teach at Charisma Gymnastics Club. I familiarised the children with four conventional blue objects from the gymnastics tools play box (i.e. four different 2D soft play objects), and separated the children into three different conditions. Children in condition one heard a noun to describe the object, e.g. "look at this circle". The second condition involved children hearing an adjective, e.g. "look at this circular one". The final condition involved children hearing no word related to the object, e.g. "look at this". The next stage of the test involved presenting children with two more objects. The first object was from the same category as the first; soft play objects, and the second was from a new category; fruit. All of the children heard "Look at what I have here" and interestingly, children in both the noun and adjective conditions both took preference of the object from the new category, fruit. By this, I mean they were able to identify the fact that the fruit was from a different category to the soft play object, so they favoured it and wanted to play with it. In contrast, children from the no word condition showed no preference between the objects. I came to the conclusion that children notice new words in spoken language, and these words have implications on their conceptual organization. Categorization was provided to the children by giving them a shared name for a set of objects, so when an unfamiliar object was presented to them, they assumed this must be of a different group. In addition, not just any word will be able to create this categorization. Children are more likely to create this connection between words and objects when they are introduced in a social and communicative context, as the words then have a clear purposeful application.

Some types of words, nouns especially, tend to be learned by children when they are presented with observational information. Most of a child's earliest vocabulary contain many names for particularly easy-to-observe objects, such as "ball", "bottle" and "dog". However, children must also acquire words for concepts which are unobservable, such as "love", "idea" or "thought". Yet even for some observable cases, there are many situations in which observation alone is inadequate. For instance, the same individual object or person can often be described using a variety of words or phrases, e.g one person can be described as a "girl" or as someone's "sister", and therefore observation alone, for these types of nouns, and most verbs, does not supply enough detail to establish significance. A noticeable demonstration of the limits of observation has been provided using the method known as the Human Stimulation Paradigm (HSP). Originally introduced by Jane

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[8] Gleitman, Cassidy, Nappa, Papafragou, Trueswell. (2005) Hard words. Lang Learn Dev
[9] Waxman, Markow. (1995) Words as invitations to form categories: evidence from 12 - 13-month-old infants. *Cognitive psychology,*

Gillette[10] in 1999, American Psychologists Snedeker and Gleitman have repeated the experiment in more modern conditions[11]. Human adults viewed a series of silent videos of natural scenes of people conversing, and were asked at various stages to guess the word that they feel the individual on the screen would have uttered. The task intended to imitate the difficulty of learning words from simple observation alone. Adults showed difficulty in guessing the correct words, regardless of the fact that they had already acquired fully developed language and already possessed linguistic and conceptual portrayals of the words in question.

I was interested in how difficult adults evidently found this, so I decided to perform a similar demonstration with my family, by simply muting the television and asking them to guess the words and direction of conversation in a short scene from 'Desperate Housewives', (which I had watched in advance and memorised extremely thoroughly). In spite of the fact my family seemed to succeed more in the noun guessing, they still struggled to follow conversation in any remotely accurate manner. In fact, the more easily the words could be pictured, the more accurately they performed, regardless of whether the word was a noun or a verb. The fact that their performance deteriorated with the words which were more difficult to picture demonstrates the boundaries of observation by itself, and additionally displays the value of additional linguistic details. In Jane Gillette's version of the HSP, adults were later offered linguistic details during the observation, causing their performance to improve. More recent work by Piccin and Waxman (2007), involving the HSP, used 3 and 7-year-old children to demonstrate the difference in acquiring nouns and verbs. They concluded that "nouns predominate because the concepts to which they refer are somehow simpler or more accessible to young learners than the concepts to which verbs refer"[12] They also found that children performed worse with relational nouns ("sister") than with concrete nouns ("table"), and even worse with mental verbs ("feel") than action verbs ("run"). This is hardly unexpected when you consider the level of conceptualisation involved in the different categories.

Research in the past decade has taken on the challenge of investigating the acquisition of more abstract words which are conceptually more demanding. This new direction is likely to lead to greater understanding of the relationship between language learning and conceptual development and also to give rise to more sophisticated theories of how children learn ideas and language. Recent research has highlighted the coordination of linguistic and conceptual systems and the ways in which they develop over time. Gleitman et al have successfully established the fact that words fall on an abstract-to-concrete scale, identifying the difficulty of acquiring the meaning of more complicated words. Additional research is still to be made concerning the strength and duality of the child-as-theorist and child-as-analyst metaphors and areas of personal interest would include the symptoms of language deficiencies in autism, particularly the process of word-learning. These language complications have been related to weaknesses in interpersonal and social skills, including "Theory of Mind". Future research may reveal whether these language difficulties also reflect impairments in

[10] Gillette, Gleitman, Lederer. (1999) Human stimulations of vocabulary learning. *Cognition*

[11] Snedeker J, Gleitman L. (2004) Why it is hard to label our concepts. In: Hall, Waxman Weaving a Lexicon. Cambridge, MA: MIT Press

[12] Thomas B. Piccin and Sandra R. Waxman. (2007) Why Nouns Trump Verbs in Word Learning: New Evidence from Children and Adults in the Human Simulation Paradigm

underlying conceptual capacities or whether they demonstrate a problem only in the effective use and understanding of words in terms of their linguistic and symbolic nature. Another exciting area includes the processes and consequences of word-learning in infancy, and whether it is continuous through to adulthood. What exactly is it that children's brains are doing? Research into learning a second language could potentially direct us into results concerning this long-term language acquisition. Whether one feels similar to Jane Wagner, and believes "we developed language because of our deep inner need to complain", or perhaps take on a similar view to Mark Amidon, that "language is the means of getting an idea from my brain into yours without surgery", it is relatively clear to see that language is what makes us human and plays a crucial role and relationship with conceptual development. In the past decade I feel that we have learned a huge amount about this crucial relationship between acquisition of the more abstract parts of language and conceptual development, but the likely progress in the decade to come strikes me personally as extremely exciting as we get closer to establishing the precise nature of the links, and through this improve our understanding of both of these important areas of Developmental Psychology.