Language Learning Lab

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In the Language Learning Lab, directed by Dr Elizabeth Wonnacott, our research investigates how both children and adults learn languages. One question concerns how young children learn the "rules" of the language they hear around them, without any explicit instruction. For example, children learning English have to learn that "The man is bitten by the dog" means something similar to "The dog bites the man", even though the words are in a different order. Children learning languages such as French and Italian learn which words are masculine and feminine, and how that changes how those words are used with other words. Children also have to learn which particular sounds their language uses –for example the Dutch words for *garden* uses a sound that English doesn't use (speaking a language using the wrong sounds is what gives you a foreign accent). Children learning languages such as Chinese, learn that the pitch of a word affects it's meaning ("ma" with a flat pitch means mother, "ma" with a falling then rising pitch means "horse").

How do children naturally learn these features of languages? Can adults do the same? Can we achieve this type of learning when teaching second languages to children and adults? Are there any factors that make learning easier? Are there any similar processes at work in learning to read the mother tongue?

One way of investigating these questions is to do experiments with children and adults in which they are taught new words and sentences and then we see how well they learn them given different types of training. We also play language learning games (snap!) with young children helping them to learn more difficult structures in English, and even do experiments using gesture to look at biases children might bring to learning language. Meet the team and read more about our ongoing work below!

Research projects

Daniela Singh - In my MSc study I explored statistical learning processes in the acquisition of spelling knowledge in Year 2 children (UK Schools). The aim was to directly test children's ability to pick up on what are known as *graphotactic* constraints. *Graphotactics* refer to regularities involving order and arrangement of letters. Some examples of graphotactic patterns that exist in English language are: *ck* does not begin a word but is a frequent spelling of /c/ at the end – as in *duck*; certain letters do not double – k, q, u, x, y; double letters appear in the middle (*bunny*), or at the end of the word (*bell*), but rarely at the beginning of the word (*eel*); the vowel /e/ is commonly spelled as *ea* when followed by the coda */d/* (as in *head*) but not when followed by *n* (as in *hen*). We learn these things when we learn to read, but we aren't taught them all explicitly. Indeed, some patterns are so complicated that even linguists have difficulty describing them, yet we seem to learn them without noticing. To test children's ability to learn and generalise graphotactic constraints, we conducted and experiment with 7-year-old children in which they read new words with new spelling patterns**:** the consonants *d* and *g* could occur with vowel *o* but never with *e* and consonants *l* and *m* could occur with vowel *e* but never with *o*. After children had spent some time looking at the words, we tested them to see if they recognized these patterns by showing them new words that either followed the rules or violated them. We found that they rejected the items that didn't follow the rules, suggesting they did pick up on the patterns without being

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taught about them explicitly. We also looked whether there was any difference in learning patterns at the beginning or ending of words (given some claims that ends of words are particularly important in spelling), however found no evidence of a difference, suggesting that children attend to both parts of the word equally, at least in this task. I am currently following up on this research in my PhD project. It is important to build our knowledge about the timeframe in which statistical learning effects occur, in order to inform educators about the importance of exposure to printed material early on, to allow for incidental learning, alongside explicit instructions.

Maša Vujović - My Master's project investigated the link between language learning and grammatical language structure. There are many grammatical structures which are very common across the languages of the world, while others are very rare. For example, languages across the world differ in word order: English has a Subject-Verb-Object (SVO) order (*The girl kicked the ball)*, but many other languages, such as Turkish, Japanese, and Hindi, have an SOV word order (something like*: The girl the ball kicked*). However some other possible word orders (VSO, VOS, OVS, and OSV) are strikingly rare. Is such a distribution of word orders across languages a coincidence, or can it tell us something about how children learn and use language? For example, it could be the case that SOV is the most common word order because children find it easier to learn or produce than other word orders. In order to test whether language learners indeed have a preference towards SOV, I asked a group of adults and a group of children to watch short video animations of cartoon animals performing simple actions (e.g. lifting a box or kicking a ball) and describe them using gesture. I was interested in the order in which they produced gestures for the animal (S), the object (O), and the action (V). I found that adults and children used SOV more than or, in some cases, just as much as SVO, but not less – even though the word order of their first language (English) is SVO. This project shows that language learners prefer certain grammatical structures over others, and these structures tend to be more common across languages, suggesting that language is shaped by human learning and communication.

Anna Samara -

Broadly speaking, my research addresses questions about language and literacy development. My current work at the Language and Learning lab (together with Dr Ben Ambridge at the University of Liverpool and Dr Elizabeth Wonnacott at UCL) asks questions about children's ability to form appropriate sentences (e.g., "The funny clown made the man laugh") in their mother tongue. We know, for example, that children learning to speak English sometimes produce errors of the type "The funny clown ***laughed the man***" (and analogous errors are presumably produced by children learning all the languages of the world), thus, we carry out experiments that investigate *what* discourages children from producing such errors in the long term.

Some of my earlier work at the Language and Learning lab (together with Dr Kenny Smith at the University of Edinburgh and Dr Elizabeth Wonnacott at UCL) has looked at children's ability to learn *socially conditioned linguistic variation*: That is, a language may have two or more alternative ways of saying something (e.g., in English, the plural "s" may be pronounced "s" as in cats, "z" as in dogs) and different variants

tend to be used in different social conditions (e.g., some variants may be predominantly used by male speakers, or speakers of one particular dialect). How early in development do learners pick up on the fact that different speakers use different variants? A series of artificial language experiments (where we teach children made up languages with new words and structures) establish that 5- to 6-year-olds reliably pick up on this type of social cue (without being explicitly told to look for any cue), even when it is imperfect (i.e., probabilistic), as it is the case in natural languages.

I also have a longstanding interest in the development of spelling, an aspect of literacy development which is relatively understudied, yet is known to be important for life-long educational success. Together with Daniela Singh and Dr Elizabeth Wonnacott, we carry out experiments that shed light on those aspects of spelling development that are less well understood, such as children's ability to learn spellings and spelling patterns incidentally.

Joanne Saul - In our research, we explained to two groups of Year 1 children that they were learning Ellie the Elephant's language. Each group saw the same pictures of animals, but one heard sentences in a made-up language and the other heard sentences containing a mixture of English nouns and made up words. For example, children might see a picture of two tigers and depending on their group they would hear either "glim panjol bup" or "glim tiger bup". The children heard many examples of the sentences over the course of 4 days. The sentences always started with "glim" but there were two options for the last word, e.g. "glim panjol bup" or "glim panjol tid", and one was more likely to occur than the other. Half way through training and at the end of the experiment, we showed children pictures and asked them to produce sentences in Ellie's language. We were interested in how children would remember the variation in the sentence endings and if they would reproduce it when they made their own sentences. A key question was whether this would be different when they were given more to remember, in the trickier language containing only made-up words. We also played some fun games to measure the children's general memory skills, to see if there would be a pattern between remembering the variation in the sentences and memory abilities.

We discovered that children found it significantly easier to remember the variation if they were learning the easier language ("glim tiger bup"). When they learnt the trickier language and had more to remember, they tended to impose a self-generated rule when they produced sentences, e.g. they always used "bup" or "tid" at the end or even a new word that was a combination of the two! There was also a moderate correlation between working memory skills and the amount of variation children reproduced. Both findings are useful evidence for the kind of effects that limited memory can have on language learning, which is important for theories that suggest that young children's poorer memory capacity may actually help them impose regularities on what they hear when they are beginning to learn language.

Chantal Miller - My project aims to assess children's abilities to track gender cues in an artificial language (a miniature language designed by the experimenter, involving new words and structures). Sociolinguistics examines how language is shaped by extra-linguistic factors such as gender. These factors introduce variation in a language,

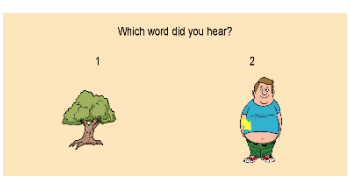
although it has been suggested that this variation is never entirely unpredictable. Instead, the use of sociolinguistic cues is based on certain patterns or rules, so the variation is conditioned. Hence, this study focuses on gender-conditioned variation. A recent study conducted by Anna Samara (above) suggested that children are able to identify and reproduce gender cues in a semi-artificial language- that is they could learn which forms were used by a female speaker and which by a male speaker. I conducted this same experiment with Year 1 students, but instead used multiple male and female speakers. This allows us to now observe whether the previous results are replicated when the children are exposed to multiple speakers. Children were asked to repeat sentences, complete sentences with the correct particle and choose which speaker said the most appropriate sentence. Data analysis is still ongoing, but it appears that children find the task of tracking usage across multiple talkers much more difficult that tracking a single talker. New experiments will address different factors that aid this type of learning.

Ellen Day - My study looks at factors affecting children's learning of grammatical structures in their mother tongue. In particular I am looking at learning of *passives* (e.g. "the dog is being carried by the lion") which are difficult for young children. My study uses a technique called *structural priming* in a learning game learning with three to four year old children. We've developed a game of snap to play with the children to see whether the sentence structure they use is influenced by the structure used by the experimenter. We're using both active (*The dog is carrying the lion*) and passive (*The dog is being carried by the lion*) sentences. In particular, we want to look at if the children are more likely to produce a passive sentence having previously heard one. Previous research suggests that this phenomenon (structural priming) does occur, and furthermore that the priming effect can be a form of learning. Consequently, we're also carrying out a comprehension test before the game and the day after. The theory is that if comprehension scores improve from day one to day two then learning has occurred. Additionally, we're also considering whether there is an advantage to hearing a structure with the same repeated verb, or with a variety of different verbs. Prior findings have suggested that there will be an advantage of high variety, helping the children to generalise and learn the structure more comprehensively, rather than associating a structure to one particular verb. Data collection is still in progress – but children clearly enjoy playing the game and we can already see that they are improving in their comprehension.

Ruta Sinkeviciute - My research project involves looking at child and adult learning of second language vocabulary learning. I am looking at whether learning is better when you hear the words spoken by multiple people (as would be common when learning your native language) or from a single person (as might happen if you only heard the language from a single teacher). During the experiment the participants (7 year olds and adults) learn twelve Lithuanian words, six of the words are spoken by a single speaker and the other six – by multiple speakers. The training task involves hearing eight repetitions of each word in random order and selecting a picture that goes with the word they hear. After the training, children are asked to complete production and comprehension tasks. Data collection is still ongoing, but we can already see that children are learning some of the words! The children in the school have been

very friendly and eager to participate in the study which made the time spent there testing an enjoyable and fun experience.

Gwen Brekelmans - My PhD project explores the different ways in which children and adults learn the sounds of languages. When children learn languages naturally (for example, if they move to a country where a different language is spoken) they are generally very successful, and more so than adults in the same situation. However, the reasons for this difference are currently unknown. I am interested in seeing what factors affect how well children and adults learn the sounds of a foreign language and, for example whether they show better learning when they hear the words spoken by different speakers, rather than by just one speaker. To investigate this, I asked both children and adults to play computer games which allowed me to test how they learned the sounds of a new language - Dutch. For example, they played games where they heard Dutch words and learned to associate them with shapes or with pictures. Afterwards, I looked at how well they learned the words – which depended on being able to hear the sounds in the words which do not occur in English. What I found was that when we presented them with various Dutch sounds, both children and adults were equally able to clearly hear the difference. Interestingly, children were able to learn to associate the new words and sounds with meaningful pictures but not with abstract shapes (even though there was actually less to learn in that version of the experiment), and did not seem to make a difference in whether the words were spoken by different speakers or by just one speaker. I am further exploring this result in new experiments with Dutch learners of English, which have possible implications for methods for second language instruction in children.



Hanyu Dong – I am interested in second language learning. In particular, my current focus is on how English speakers can learn the "tones" in Mandarin Chinese. Recently I have finished an experiment using a using a word learning game to train native English speakers to distinguish Mandarin tones. We find that adult participants can learn the words and at the same time their associated tones. Ongoing experiments use this same game with children, so we can compare their learning. Planned new studies will also be looking at how individual differences such as musical background and phonological memory affect the efficiency of Mandarin learning.