SPEECH PRODUCTION THEORIES AND MODELS

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Speech production is understood by many linguists as transformation of ideas into articulatory movements, sequencing speech sounds. Speech production process involves a number of tasks like conceptualising an utterance, building its syntactic structure, retrieving the right words in the right order, and controlling the articulators in order to pronounce words in a sentence. The main task when describing speech production processes ist o explain how smaller units are selected by the brain and then combined in a particular order in sentence structures. If we look at the speech production process scheme suggested by Levelt (1989), we can see the following three constituent stages:

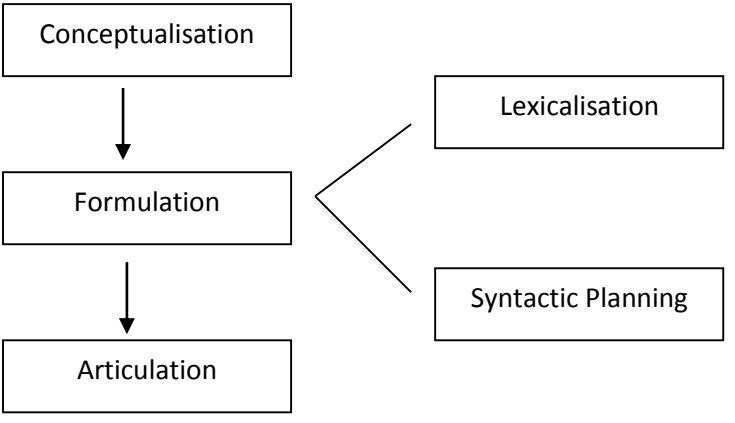


Fig.1. The Process of Speech Production after Levelt [5]

The first stage is **Conceptualisation**. This is when the speaker is expected to decide on the message he is going to convey. The final

product of this stage is when the message itself has been decided by the speaker but it still has no linguistic form. The stage of message conceptualization is also called the preverbal message or the message level of representation. This stage in academic literature is often represented by a thought bubble.

The second stage is **Formulation**. It happens when the speaker coverts the message into a certain linguistic form. This stage comprises two basic activities: lexicalization and syntactic elements planning. Basically, lexicalization envisages selecting the appropriate wording for the message, while syntactic elements planning focuses on arranging the selected words in the right order and adding corresponding grammatical elements to them.

The third stage is Articulation. At this stage the speaker plans motor movements necessary to convey the message.

As a fourth stage could serve the **Self-Monitoring** stage when the speaker tries to check the message and edit it regarding possible speech errors. This stage is crucially important due to the fact that most of speech production models are formulated based on the observed and categorized groups of speech errors.

Each stage of the above mentioned speech production process can witness various types of errors. Thus at the conceptualizing stage slips of mind could be recorded, while at the the formulating and articulating stages different types of slips of tongue are noticed and described.

In academic sources there are several speech production models described which focus on various speech production aspects. Thus, Fromkin V.A. suggests six speech production stages [3]:

Table 1

Model of Speech Production after Fromkin V.A. (1971)

Stage	Speech Process
1	Identification of meaning – a meaning to be conveyed is generated.
2	Selection of a syntactic structure – a syntactic outline of the sentence is constructed, with word slots specified.
3	Generation of intonation contour – the stress values of different word slots are assigned.
4	Insertion of content words – appropriate nouns, verbs, and adjectives are retrieved from the lexicon and placed into word slots.
5	Formation of affixes and function words – function words (articles,

	conjunctions, prepositions), prefixes, and suffixes are added.
6	Specification of phonetic segments – the sentence is expressed in terms of phonetic segments, according to phonological rules.

One can easily observe that stage one in Fromkin's model corresponds to conceptualization stage in Levelt's model, stages two through five in Fromkin's model correspond to Lavelt's formulation stage, and finally, the last stage in Fromkin's model corresponds to Lavelt's articulation stage.

Another speech production model explaining how message content is mapped into form was suggested by Garrett [4]:

Table 2

Model of Speech Production after Garrett (1975)

Stage	Speech Process
1	Message Level Representation – inferential processes applied to conceptual structures build a representation that is a real-time construct determining sentence level construction.
2	Functional Level Representation – words (lemmas) are selected on the basis of how well their meaning encodes elements of Message Level Content.
3	Positional Level Representation - word forms (lexemes) are retrieved (based on the selected lemmas) and are combined with closed morphemes that are spelt by the rule.
4	Phonetic Level Representation – phonological operations then apply to Position Level representations to make them conform to the phonotactics of the language.

Dell and Reich (1981) presented statistical evidence, based on speech errors analysis, showing that errors of selection and errors of phonological encoding were not absolutely independent [1]. As a result Dell (1985) develops the so-called connectionist model of segmental activation and selection where he accounts for four major tasks of the phonological encoding and mainly: word segments lexicon specification, construction of phonological frames, segment to frame slot association, and a filled frame translation into phonetic or articulatory program. Dell (1985) focused on production and identification of several specific effects of phoneme-to-morpheme feedback in speech production. Dell's model claims, that speech is produced by a number of connected nodes representing distinct units of speech (among which are phonemes, morphemes, syllables,

concepts, etc.) that interact with one another in any direction, from the concept level (Semantic level), to the word level (Lexical selection level) and finally to the sound level (Phonological level) of representation [2].

There are many models of speech production that psycholinguists attempted to elaborate from early 70-s past century till today. Nowadays focus in studies of speech production shift to comparing and contrasting monolingual and bilingual speech production, verbal and non-verbal, natural and artificial (computer generated) speech production. These studies allow to understand how humans generate language in order to teach computers do it.

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