STUTTERING AND PHONETIC THEORY: AN INTRODUCTION

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Stuttering has been traditionally defined as a "disorder in the rhythm of speech, in which the individual knows precisely what he wishes to say, but at the time is unable to say it because of an involuntary repetition, prolongation or cessation of a sound" (ICD 9, WHO 1977: 202). Stuttering could be defined as a typically childhood disease, because it begins between 16 to 66 months of age and less than 5% of children begin to stutter after they pass the 5th year of age (Yairi & Ambrose, 2005). Its incidence is around 10% of all the children but its prevalence is only around 1%, due to the overwhelming probability of spontaneous recovery (90%; Yairi & Ambrose, 2013). Anyway, if spontaneous recovery does not happen within four years from stuttering onset, that child is very likely "destined" to persistence.

As a phonetician, two main questions about stuttering are worthwhile. The first is: "Why would Phonetics be so important in the study of stuttering?" A possible answer could be that Phonetics is a borderline discipline, both in the sense that it has a theoretical as well as an applicative character, and in the sense that it is at the convergence of different scientific realms, such as linguistics, physics, biology, psychology etc. As a borderline discipline, it holds a privileged key for unifying and simplifying the understanding of stuttering that presents itself as a multidimensional phenomenon (made of sociocultural, psychological, physiological and genetic factors). In fact, one can say that, in order to accomplish a causal function in stuttering, each of those variables must at the end act on the motor control processes of the speech apparatus (Smith & Kelly, 1997). Phonetics has more of an advantage in the description of these speech processes than other linguistic disciplines because, as Lindblom (1995) said, "can invoke knowledge which is relevant to speech but which was acquired independently of it […], such as information on the general mechanisms of hearing and motor control".

The second, and specular, question is: "Why should phoneticians be interested in stuttering?" Once again, we could answer that phoneticians could feel attraction towards a speech disorder that selectively affects fluency, leaving essentially intact the syntactic and grammatical structures in individuals that are judged to be safe and normally endowed with reference to cognitive and affective aspects. At the same time, the speech aspects under investigation in stuttering are at the heart of a number of theories of speech production (Weismer et al., 1995). In fact, these theories can be affiliated to two great families on the basis of their solutions to the problem of speech timing: the extrinsic and intrinsic timing theories (Fowler, 1980). The first ones postulate the existence of a timer, possibly not specific to the speech mechanism, which put in sequence a series of discrete and timeless units (i.e. columns of distinctive features); the second ones, also called "gesture theories", bring the timing organization back to the general dynamic property of the articulatory system. The validity of these theories could - in the end - be proved by their power in explaining timing phenomena that are characteristics of stuttering, like, among others: articulatory slowness, variability of speech production (across repetitions), segmentalization (reduction in the extent of the coarticulation) (Kent, 1997).

The organization of the individual contributions at this special session will proceed from more general and more "peripheric" (in the sense of the analysis of stutterers' speech based on the "auditory perceptions" of the hearers), to the most recent instrumental researches, passing from acoustics and kinematics to arrive to neurophysiology. Prof. Robin Lickley will start by laying the foundations for every analysis of stuttered speech, that is the analysis of disfluencies: blocks, prolongations and repetitions, which are the hallmark of the disorder (see the ICD 9 definition at beginnings). Prof. Lickley will show that "while typical disfluencies are mostly influenced by cognitive issues in the planning of speech and only rarely by motor control issues, stuttered disfluencies result from a break down in the coordination of the complex motor commands

necessary for successful articulation".

In recent years, the focus on the motor aspects of stuttering led to considering disfluencies as only one of the many ways speech could become disfluent. According to Starkweather (1987), disfluencies make the speech “discontinuous". But fluency is multidimensional: not only is fluent speech (relatively) devoid of discontinuities, but it is also produced with a regular rhythmic beat, in rapid rate and without excessive physical and mental effort. There are stutterers without disfluencies: they are affected by "covert/subperceptual stuttering" and often they perceive in speaking excessive levels of muscular effort and "cognitive tension" that can pass unobserved to the eye and the ear of the clinicians. Considerations like these led speech researchers to concentrate on the perceptually fluent speech of stutterers, on the the belief that stutterers' speech could be abnormal even when the person is not stuttering. Acoustic and kinematic analysis, often associated to brain imaging or to electrophysiological technique, have been used more and more, and speech motor control theories have become the preferred theoretical frame by most of the scientists.

Another important point to keep in mind when we study stuttering is that differences found between stutterers and nonstutterers could not be the direct manifestations of stuttering but the reactions of the subjects to stuttering. As a consequence, it could be very important to study the affected subjects before they could possibly develop coping reactions, that is, in the preschool years. The contribution of Dr. Giovanna Lenoci will illustrate a particular application of this methodological recommendation, such as the acoustic and kinematic analysis of coarticulation, which also mantains a great potential as an early predictor of stuttering persistence. This point helps to remember that all of us, as adult fluent speakers of one or more language, we attained this unique capacity through a long process of acquisition and learning, during the pre-school years. This is the period of the greatest and fastest development in anatomophysiological structures and functions, and in linguistic, cognitive and motor abilities as well, and phonetic sciences could tell us a lot about the possible ways this acquisition process could go wrong and produce stuttering.

Dr. Pierpaolo Busan will conclude the special session by illustrating his personal and innovative research on stutterers' neurophysiology, and he will show how the most recent model of speech motor control, as the State Feedback Control models, have benefitted from studying stuttering, which has been interpreted as a defect in sensory-motor integration. Even in this case, “findings may be useful for new treatment solutions for stuttering, ranging from neuromodulation to neurofeedback”.

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