

Production and perception data for intonational category identification

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Intonation may convey various kinds of information. For instance, by means of intonation, among other parameters, speakers may express their emotional state, or, conversely, they may get cues of the emotional state of their interlocutor. Moreover, at least in some languages, speakers may switch from a declarative to an interrogative interpretation of a sentence only by means of intonation, that is without other linguistic cues, such as syntactic ones. In the latter case, it is usually quite straightforward to find which are the main intonational characteristics that convey the different interpretations of a sentence, i.e. that identify two utterances as belonging to two discrete sets of interpretations. In the case of utterances conveying emotional states, the difference may be less clear cut, first of all because of the gradual variation that may characterize the increase/decrease of emotions. Thus, at least in some cases, it is quite clear that speakers may produce patterns which belong to different intonational categories for conveying different interpretations of a sentence; conversely, listeners may recognize one of the possible interpretations of a sentence as they identify a pattern as corresponding to one category rather than to the other.

Various studies described in the literature have been conducted in order to cast light on the existence and differentiation of categories in intonation, considering both production and perception data. Most of times, goal of the studies was to tease apart a linguistic use of intonation, taken to be categorical and corresponding to discrete sets of interpretations, and a paralinguistic one, considered as not categorical and corresponding to gradual changes in degree of meanings. Thus categorical uses of intonation are the goal of studies such as those stemming from the analysis of recordings and aiming at finding discrete intonational patterns associated to different linguistic functions or meanings; similarly, categories are the goal of studies considering judgements of subjects in relation to audio stimuli. Variations usually considered as relevant from a linguistic point of view, i.e. categorical, are accentuation, focus, phrase signals. These elements signal - and are studied in relation to - linguistic functions such as distinguishing sentence modality, yes-no questions from wh- ones, check of information, continuation, or direct and indirect speech acts (see works carried out within various frameworks, such as the British one, the autosegmental framework or the IPO one [Cruttenden, 1986; Pierrehumbert and Beckman, 1986; Casper, 1998]); on the other hand, accentuation, focus, phrasing are reported to signal meanings such as introducing a new element to mutual beliefs, selecting it from the background, interpreting it with the following, signalling finality or openness [Gussenhoven, 1984; Pierrehumbert and Hirschberg, 1990; Kohler, 1991]. However, within a certain category, gradient variation are reported to relate to degrees of meaning related to specific linguistic units or differences such as statements and contradictions [Kohler, 1991; Ladd and Morton, 1997].

In the literature, intonational categories are defined and individuated on the basis of both auditory and acoustical analysis of production materials and perception data. As for the latter, apart from only looking for perceptual equivalence independently of specific meanings or functions (e.g., in the IPO approach), most works consider production material, individuate functions or meanings of specific entities and then test their categorical status by means of perception experiments. Especially within these works, discussion may be found on various methods for testing perceptual relevance, such as the adoption of the Categorical Perception paradigm, born for testing segmental contrast of consonantal segments [Repp, 1984]. However, some works also point out the existence of cases of production-perception mismatches, such as the fact that production data suggest syllable onset as reference point for alignment [Caspers and van Heuven, 1992; van Santen and Möbius, 2000] while perception data point to vowel onset as crucial for tone comparison [House, 1990:113]. Apart from methodological issues, however, researchers are aware of possible problems related to the main assumption found in studies on intonation, i.e. the relevance of categories of discrete entities in the linguistic study of intonation. As Kohler [2006] observes few intonational meanings

are actually found in the linguistic domain, while intonation is mainly concerned with paralinguistic. Thus rather than looking at strictly linguistic aspects related to intonation, analyses could focus on communicative functions and meanings and “categorical perception in the classical sense is therefore a special case and not essential for pitch categorization”.

In this work, methods for collecting and analysing data, both in production and perception, will be overviewed, and emphasis will be put on the difficulties that may be encountered in finding evidence for the existence of categories in intonation, or at least in finding coherent perception data for some of the categories which seems to be clearly emerging from the analysis of production material. Both production and perception experiments on the variety of Italian spoken in Pisa will be discussed. Both read and semi-spontaneous - Map-Task - speech material show the existence of patterns related to different functions/meanings; on the contrary, perception data seems to be far more problematic: identification and discrimination tests, i.e. the CP paradigm, together with imitation tasks focussing on Pisa Italian pitch accents show that contradictory results arise in production and perception, neither confirming the presence of clear categorical differentiation among patterns nor excluding it. Apart from considering characteristics in the experimental designs that may have influenced the results, and the possible lack of phonological distinction in case of some pairs of patterns, the discussion will focus on problems which are specific to intonation, and that may shed some doubts on the ‘absolute’ relevance of perceptual categorical distinction of intonational patterns. Problems may be due to the form of intonation and the use of resynthesized continua, as it happens in most experiments; or, to make another example, problems may concern the meanings/functions of intonation, which are definitely more general and less clearly defined than those exploited for experiments on segments.

It will be suggested that both production and perception should be taken into consideration in deciding whether there is a contrast, and that production could, indeed, be more robust than perception, especially for intonation; attention will be focus on the fact that intonation is not only phonological or phonetic but rather morphological, and on the fact that this should be taken into account for considering different procedures or for interpreting results. The idea is to underline that the fact that intonational meanings are not clearly differentiated, or that languages may lack intonational contrasts that are really adapt for perceptual testing should not be enough to conclude that those languages do not exploit a phonological contrast.