Neurolinguistic & psycholinguistic investigations on evidentiality in Turkish

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CHAPTER 6

6. General discussion

This dissertation reported the results from four experimental studies on the neurolinguistic and psycholinguistic aspects of evidential verb forms in Turkish. In the neurolinguistic aspects, pathological deterioration of the evidential morphology in agrammatic patients was addressed. In the psycholinguistic aspects, online processing of evidential forms was investigated in heritage bilingual speakers and compared to monolingual speakers. Both of these perspectives have shown that evidentiality is a vulnerable domain: it is affected in agrammatic speakers and attrited in heritage and late bilingual speakers of Turkish. In this chapter, the findings as well as their implications will be discussed.
6.1. Questions addressed in this dissertation

With the studies of this dissertation, an effort has been made to understand the cognitive underpinnings of evidentiality in Turkish with regard to its deterioration in individuals with aphasia and in heritage speakers of Turkish. Aphasia and attrition are obviously not ‘a priori’ similar forms of language loss. However, the evidentials share similar ‘fates’ when it comes to their impairments in aphasia and the way they attrite in heritage speakers and late bilinguals.

The following four main research questions were addressed in the four studies presented in this dissertation:

1) Are Turkish agrammatic speakers able to produce the evidential verb forms that are linked to the respective information sources; are they able to identify the information source perspectives that the evidential verbs map onto?

2) Are the uses of the evidential verb forms affected compared to other verb forms in Turkish agrammatic speakers’ narrative speech production?

3) To what extent is Turkish heritage speakers’ processing of the evidential verb forms affected by incomplete acquisition or attrition? Do the heritage speakers retain a monolingual-like sensitivity to sentential contexts where evidential forms are violated?

4) How do Turkish heritage speakers, as compared to late bilinguals and monolinguals, interact with forms of visual evidence presented in a virtual visual-world setting while listening to sentences with evidential forms, consistent with the given visual stimuli?

The following sections provide the main conclusions drawn from those studies as well as directions for future research.
6.2. Major conclusions

6.2.1. Neurolinguistic aspects of evidentiality

A significant body of research has shown that agrammatic speakers have problems with verb forms that refer to the past (Abuom & Bastiaanse, 2013; Bastiaanse et al., 2011; Bos & Bastiaanse, 2014; Bos et al., 2014; Martínez-Ferreiro & Bastiaanse, 2013; Rofes et al., 2014; Simonsen & Lind, 2002; Stavrakaki & Kouvava, 2003). The Past Discourse Linking Hypothesis (PADILIH) accounts for the difficulty of referring to the past in agrammatic aphasia. The first two studies reported in this dissertation (Chapters 2 and 3) addressed this issue.

(1) Production of evidential forms is impaired in an opposing direction to impairments in source attribution in Turkish agrammatic aphasia

Our first research question asked whether Turkish agrammatic speakers are able to produce the evidential verb forms in sentences that are linked to different information sources. Furthermore, it was asked whether the agrammatic speakers are able to identify the information-source perspectives that the evidential verbs map onto.

These questions were explored in Chapter 2. Consistent with the predictions of the PADILIH, Turkish agrammatic speakers’ production of sentences requiring a direct evidential form was impaired, whereas the production of the indirect evidential forms was relatively spared. Selection of an indirect evidential over the direct one is determined by the availability of indirect evidence. In both the inference and reported contexts, when the speaker obtains the information on an event, the event has already occurred, and hence, for the use of an indirect evidential form the actual event time is irrelevant. The direct evidential form, however, requires discourse linking, as its use is linked to a directly witnessed past event. It is particularly hard for agrammatic speakers to retrieve and inflect a verb that is licensed by direct information.
Our second question was whether the evidential verb forms are affected with respect to other verb forms in Turkish agrammatic speakers’ narrative-speech production.

This question was addressed in Chapter 3. Our findings showed that Turkish agrammatic speakers exhibited reduced normal number of verbs, yet the diversity of these verbs was reduced. The agrammatic speakers’ production of finite verbs was intact. However, for the direct evidentials, there were individual differences among the agrammatic speakers as reflected in a trade-off pattern between verb inflection for the direct evidential and verb diversity. These data are compatible with Bastiaanse’s (2013) claim. That is, retrieving the name of an event and inflecting it for the time frame in which the event takes place is arduous for agrammatic speakers, at least for the direct evidentials, which was found to be the most difficult for agrammatic speakers to produce on a sentence-completion task, as shown in Chapter 2.

The results from both Chapters 2 and 3 suggest the agrammatic speakers have particular problems with the direct evidential form. Recall that the findings from the source-identification task presented in Chapter 2 showed that recognizing indirect information (e.g., inference and report) is more difficult for agrammatic speakers than directly witnessed information sources. In other words, the agrammatic speakers are aware that the direct evidential form used in sentential contexts is associated with information they perceived themselves. Therefore, the agrammatic speaker’s problems with producing direct evidential forms cannot be explained on the grounds of impairments in discriminating information sources. The impairment in the linguistic form (e.g., direct evidential) does not correspond to the impairment in the information-source perspective that underlies the form (e.g., direct witnessing). This is consistent with the preliminary data in Arslan and Bastiaanse (2014a) who, using a source-memory task, showed task that Turkish-speaking patients with aphasia are better in attributing seen objects to their names than they do so for heard objects (i.e., based on someone else’s report).

But why do the agrammatic speakers have problems with verbs conveying the speaker’s direct information, although they were able to
recognize that the events presented to them had been visually witnessed? Obviously, Turkish agrammatic speakers have difficulties in referring to the past, as the PADILIH predicts, and the form that conveys the speaker’s direct information is the most difficult for them. However, there is another possibility to be addressed in future research since spared source recognition for directly witnessed events is not what the PADILIH expects. This possibility is that brain lesions that result in agrammatic aphasia disrupt the neural network that is responsible for representing events described by evidentials and their information sources in a dissociative way. Such dissociations are not in fact rare in neuropsychological studies. For instance, Janowsky et al. (1989) found dissociations between remembering an item and its source in patients with frontal-lobe dysfunctions. The authors reported that their patients were able to remember the events that had been presented to them yet not to remember the source for these events; the patients who mistook the events remembered the sources for them correctly. Future research can show to what extent agrammatic speakers of Turkish retain memories for information sources of events that are presented appropriately for the uses of direct and indirect evidential forms.

The aphasia studies have shown how evidential inflections are affected in agrammatic aphasia. It was one of the questions of this dissertation to demonstrate how the evidential forms are affected in heritage bilingualism. The next section provides our conclusions from the studies that were administered to heritage speakers of Turkish.

### 6.2.2. Psycholinguistic aspects of evidentiality

Previous work has shown that heritage speakers (i.e., early bilingual speakers of minority languages) have compelling difficulties with the verb-inflection morphology of their first language (Albirini et al., 2013; Albirini et al., 2011; Anderson, 1999, 2001; Bolonyai, 2002, 2007; Montrul, 2002, 2008, 2009; Montrul et al., 2012; Polinsky, 2006; Rothman, 2007; Silva-Corvalán, 1994). Some of these studies attribute heritage speakers’ difficulties with inflectional morphology to the vulnerability of the
linguistic architecture. In particular, integrating information form multiple linguistic levels (e.g., syntax–pragmatic interface) proved to be affected in language attrition (Sorace, 2000; Sorace & Filiaci, 2006; Sorace & Serratrice, 2009) and in heritage speakers’ first language performances (Montrul, 2009). This is captured by the Interface Hypothesis (see Sorace, 2000, 2011). In the studies reported in Chapters 4 and 5, we tested these particular claims.

(2) Evidentiality is a vulnerable domain in Turkish heritage speakers

Our third question was whether Turkish heritage speakers’ processing of evidential verb forms is affected by incomplete acquisition or attrition. This question was explored in the study reported in Chapter 4. The rationale behind this study was to unveil whether the Turkish heritage speakers retain a monolingual-like sensitivity to sentential contexts where evidential forms are violated.

Our findings demonstrated that the Turkish heritage speakers performed less accurately and more slowly in responding to evidentiality violations than in time-reference violations, and that they did not differ in their responses to the violations of both evidential forms. This is in part compatible with the Interface Hypothesis. We have argued that the evidential morphology is relevant to the syntax-pragmatics interface, as the morphological form has to be integrated with domains of semantics and pragmatics. Therefore, the heritage speakers were insensitive to violations of both evidential forms. Recall that the time-reference violations were constructed in participles positioned in relative clauses, and thus, syntactic features license the uses of these participles. This explains why the time-reference violations were not as difficult as the evidentiality violations.

Note that Sorace’s claims on ‘interface vulnerability’ are not restricted to linguistic interfaces, but also covers interfaces between syntax and other cognitive domains. This implies that language structures that require processing at the interface of syntax and other cognitive domains are harder to acquire during bilinguals’ developmental stages than structures requiring mere ‘syntactic computation’ (see also Sorace (2011). This, of
course, raises the question whether there is a language structure in Turkish that only requires syntactic licensing. As mentioned above, our sentence stimuli used to test processing of time reference contained participle forms in relative clauses that syntactic features, assumedly, govern. However, does this mean semantic processing is not involved at all? The participle forms refer to past and future time-frames. Although, according to the claims of Turkish linguists, time reference of participle forms are bound by the matrix-clause verbs (at least, when they align in the same time frame), one cannot ignore the involvement of semantic and pragmatic contents here. Also see Montrul (2011) for arguments on how language structures may actually be relevant to different interfaces depending on their uses in differential contexts. Therefore, it remains unclear whether Turkish heritage speakers perform worse on evidentiality compared to time-reference sentences because evidentiality is relevant to syntax-pragmatics interface or because its use requires other cognitive domains (i.e., source memory). Thus, it cannot be concluded that our data support or falsify the Interface Hypothesis.

(3) **Turkish heritage speakers do not interact with the evidence as monolinguals do**

The final question was how Turkish heritage speakers, as compared to late bilinguals and monolinguals, process with forms of visual evidence presented in a virtual visual-world setting during listening sentences with evidential forms consistent with the given visual stimuli. This question was explored in Chapter 5. The rationale behind the study was to reveal how heritage speakers interact with evidence in the real world while they processed the evidential morpheme. The most viable way to test this interaction was to design an eye-movement monitoring experiment using a virtual visual-world paradigm.

Our findings showed that both late and early bilinguals (i.e., heritage speakers) responded less accurately in the direct-evidential condition as compared to the monolinguals. The bilingual participants’ responses to the indirect-evidential condition, however, were similar in both accuracy and RTs to those of the monolinguals. Both late and early bilinguals responded
less accurately to the direct- than to the indirect-evidential condition, while the monolinguals showed no difference between these two conditions. The proportion of looks data showed a similar difference between the bilingual and monolingual participants’ looks at the target in the direct compared to the indirect evidential condition.

There were two main conclusions drawn from these data. The first one is that both early and late bilinguals are affected by a form of attrition rather than by incomplete acquisition. Montrul (2008) argued that in heritage speakers, incomplete acquisition (or early childhood attrition) results in more severe difficulties than attrition in late bilinguals. Our findings are not consistent with this observation. However, the extent to which erosion in evidential morphology in bilingual Turkish speakers caused by attrition or by incomplete acquisition cannot yet be demonstrated. First, it is unclear when monolingual children’s acquisition of evidential system is complete. Second, to test whether attrition or incomplete acquisition has differential outcomes on the erosion of evidential morphology, longitudinal studies have to be conducted on both heritage and late bilingual speakers.

The second main conclusion from Chapter 5 was that the eye-movement data showed that the direct evidential is more affected in Turkish heritage grammars. The Interface Hypothesis predicted the opposite. If involvement of cognitive domains adds to difficulty acquiring certain structures in bilingualism (or makes their loss possible), the indirect evidential should have been more eroded. One reason for this is ‘complexity’: the indirect evidential form is rather complex in its semantics, as it marks reported and inferred events that the speaker knows indirectly. It is conceivable that inferential reasoning (as well as representing and integrating knowledge of other speakers) develops at later stages of children’s language acquisition compared to the direct perception of events (e.g., Aksu Koç, 2009; Öztürk & Papafragou, 2007, 2008). Another reason why the Interface Hypothesis predicted erosion of the indirect evidential is markedness. As Sorace and Serratrice (2009) claimed that the marked forms may be prone to processing limitations in bilinguals compared to the default forms. If this is true, the indirect evidential should have been affected more than its direct counterpart. In brief, the data from both experiments do not
support the Interface Hypothesis with regard to the erosion of evidential morphology.

One possibility that needs to be tested in future research is whether or not evidentiality erodes easily under incomplete acquisition and attrition due to the transfer effects from the dominant majority language. In the studies reported in this dissertation, the bilingual individuals spoke Dutch or German as their dominant second language, languages that do not have an evidential paradigm in their grammar. The idea fits well to the eye-tracking data, which indicated that both heritage and late-bilingual speakers were less attentive to the direct-evidential condition as compared to monolingual Turkish speakers. According to the claim made here, bilingual speakers of two languages that both have obligatory grammatical evidentiality should show no effects of language loss in the semantic and pragmatic content of the evidential forms.