"What are you laughing at?" Incremental processing of laughter in interaction

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Abstract

In dialogue, laughter is frequent and can precede, follow or overlap what is laughed at. In this paper, we provide a prelimary, but unitary formal account of how forward- & backward-looking laughter are processed and integrated, using Dynamic Syntax which already has well-motivated accounts of repair, split utterances and feedback.

1 Introduction

In dialogue, laughter is very frequent and can constitute up to 17% of the total duration of conversation (in French part of the DUEL corpus, Tian et al., 2016). Following the terminology from conversational analysis (Glenn, 2003), we employ the term *laughable* to refer to what the laughter is pointing at, without making any claims about its possible humorous content.

According to preliminary work on the sequential distribution of laughter (Tian et al., 2016), 90% of laughables are present in the conversation in which they occur and can be 'laughed about' more than once. Laughter can precede, follow or overlap the laughable, with the time alignment between the laughter and laughable dependent on who produces the laughable and the form of the laughter. Laughter can interrupt either one's own or one's conversational partners' utterances and this interruption does not necessarily occur at phrase boundaries (contra Provine (1993), e.g. 'She is a his long-term heh friend').

In this paper, we present a *unitary* (if preliminary) account of how laughter can be processed and integrated, following Dynamic Syntax (Kempson et al., 2001, 2016, henceforth DS) accounts of repair in dialogue (Hough, 2014; Eshghi et al., 2015) and *Feedback Relevance Spaces* (Howes and Eshghi, 2017a), This account focuses on what laughter is doing as opposed to trying to determine its meaning (c.f. Ginzburg et al. (2015); Mazzocconi et al. (2018)). Much like repair and feedback, laughter can occur sub-sententially and can be categorised as forward-looking or backward-looking. We model it analogously to pronouns, which can also be backward-looking (anaphoric) or forward-looking (cataphoric). Just as with pronouns, the laughable can come from linguistic material, or something non-linguistic in the context (as e.g. when we laugh at someone slipping on a banana peel).

2 Laughter in Dynamic Syntax (DS)

We are here using DS-TTR, and the formula decorations are record types (Cooper and Ginzburg, 2015; Purver et al., 2011). Space constraints do not allow us to introduce the DS machinery (see Kempson et al., 2016; Cann et al., 2005a; Eshghi et al., 2012); so we proceed directly to the analysis. We treat different types of laughter including forward-looking & backward-looking laughter *uniformly* as anaphoric. Akin to pronouns, this is done by projecting on the node under development, a formula meta-variable, together with a requirement for a fixed formula to be found ($?\exists \mathbf{x}.Fo(\mathbf{x})$). The difference with pronouns is that laughter provides the additional semantic information that the laughable – the 'referent' to be identified – is laughed at. This extra semantic information is provided on a DS LINKed tree, linked to the node under development, with its root content later *conjoined* with that of the laughable at a later point when LINK-EVALUATION applies (see Fig. 2). Fig. 1 thus specifies a single lexical entry for laughter.

Paired with the LATE-*-ADJUNCTION mechanism in DS – used to model right-periphery phenomena, such as short answers to WH-questions (see Gargett et al. (2009) & Cann et al. (2005b), chapter 5) – this provides all that is needed for the incremen-

laughter

IF	$?Ty(X)$
	$\neg\langle\downarrow_L\rangle\exists x.Tn(x)$
THEN	$\texttt{make}(\downarrow_L)$
	$\texttt{go}(\downarrow_L)$
	$\texttt{put}(Ty(X))$
	$\texttt{put}(Fo(\begin{bmatrix} head & : X \\ p_{=laughable(head)} & : t \end{bmatrix}))$
	$\texttt{go}(\uparrow_L)$
	$\texttt{put}(?\exists\mathbf{x}.Fo(\mathbf{x}))$
	$\texttt{put}(Fo(\mathbf{U}))$
ELSE	ABORT

Figure 1: Lexical Entry for ⟨*laughter*⟩

tal interpretation of forward- and backward- looking laughter, whether the laughter occurs *locally* or is more distant from it, much like how anaphora and cataphra are modelled in DS.

Fig. 2 illustrates the process of parsing a forward-looking laughter, where the laughter is immediately followed by the laughable, "a telescope" — here we only illustrate the $Ty(e)$ subtree under development, which is attached to a larger tree with root node $Ty(t)$. Initially, the laughter token annotates the pointed node of ?Ty(e) with a metavariable ($Fo(\mathbf{U})$), and the attendant formula requirement, then LINKing off of that node to project the laughter's semantic information on the LINKed tree. This leads to a type-complete node, but one which still requires a fixed formula value. Without the process of LATE-*-ADJUNCTION, the parsing of the follow-up NP would be precluded. However, LATE-*-ADJUNCTION allows an *unfixed node* to be introduced immediately below the $Ty(e)$ node, with the pointer moving onto to this unfixed node (connected with the dashed line). This then allows the follow-up NP, "a telescope" to be parsed as normal, leading to the bottom tree in Fig. 2. This is followed by steps of MERGE and LINK-EVALUATION, integrating the content of the laughter with the laughable NP, and allowing the parse to continue as normal.

Discussion Our model is couched purely in processing terms: it remains agnostic about the meaning of laughter, which can be determined by other factors such as intonation, social context and common ground. A reasonable approach to tackle this issue is to extend the account of integrating laughter into dialogue grammar (Ginzburg et al., 2015).

If no appropriate laughable is found, there is the possibility of clarification interaction (e.g. "What's funny?"). However, clarification requests of laughter are rare (Mazzocconi et al., 2018), suggesting that what counts as a laughable is a very widely applicable notion such that the laughter can almost always be resolved to some laughable.

Laughter by another may also serve as positive signal of understanding, i.e have a *grounding effect* (Clark, 1996). Within the DS-TTR model, this grounding effect is also captured *for free* following the DS model of feedback in conversation such as backchannels & clarification requests (Eshghi et al., 2015; Howes and Eshghi, 2017b); this is because backward-looking laughter is treated as a *continuation* or *completion* (Howes, 2012). See Eshghi et al. (2015) for details.

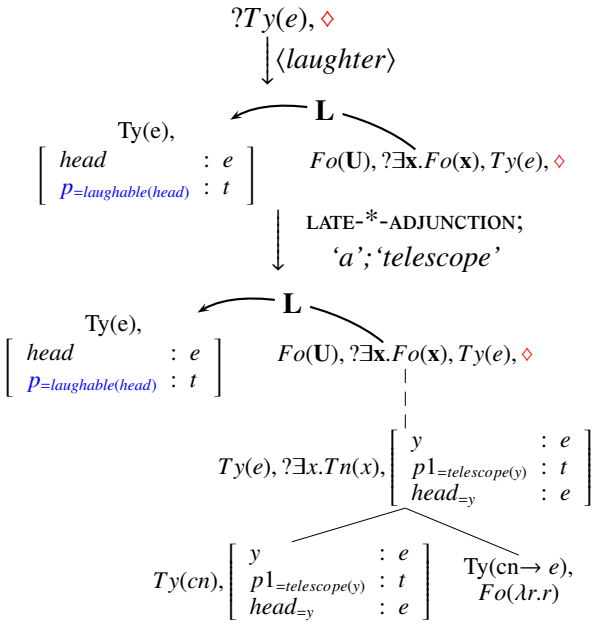

Figure 2: Processing "... ⟨*laughter*⟩ *a telescope*"

We have also not provided an account of how laughter is distributed syntactically in conversation. We plan to conduct further research investigating how the grammar of a languages provides opportunities for laughter using data with precise laughter annotation collected in the DUEL (French, Chinese and German, Hough et al., 2016) and NOMCO (Nordic languages, Navarretta et al., 2012) projects. We hypothesise that just as with patterns of repair, which vary across languages (Rieger, 2003) because of the specific features of the language (e.g. English allows self-repairs which repeat the determiner before a noun, but this strategy is not available for languages without determiners as separate words, such as Persian) there will be different patterns of laughter placement in different languages, constrained by the unfolding structure of the linguistic input.

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