

# Towards an annotation scheme for causes of laughter in dialogue

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**Abstract** This paper presents a first attempt to develop an annotation scheme for laughter in dialogue operationalising the previously reported idea of laughter being caused by incongruity, and based on violations of Grice’s maxims. This exploratory scheme is intended to form the basis of a spoken dialogue system that can laugh during dialogue in a human like manner and can understand why users laugh. We present the scheme and discuss preliminary results.

## 1 Introduction

Recent research has focussed on creating more human-like spoken dialogue systems by means of adding capabilities to produce (Ding et al., 2014), or recognise laughter (Truong and Van Leeuwen, 2007; Tahon and Devillers, 2015; Kaushik et al., 2015), react appropriately (Niewiadomski et al., 2013; El Haddad et al., 2016), recognise sarcasm (Tepperman et al., 2006), be humorous (Katevas et al., 2014; Nijholt et al., 2017), and discover how and where laughter occurs in dialogue (Tian et al., 2016; Glenn, 2003). However, there is no agreement on the causes of laughter, with, for example, some research which focusses on humour (Hempelmann and Attardo, 2011; Raskin, 1985), and other research which highlights the social functions of laughter, such as affiliation and agreement (Chapman, 1983; Scott et al., 2014), and qualitative analysis of the roles of laughter in interaction and its coordination with speech (see Glenn, 2003, for a review of conversational analysis approaches to laughter).

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Furthermore, as argued by Mazzocconi et al. (2016), existing taxonomies of laughter have reliability issues: they mix the functions that use laughter as a means of communication with the different emotions that laughter triggers. For example, in Poyatos (1993), affiliation (i.e. agreement laughter) is roughly the illocutionary act performed by laughter, while joy is a feature triggered by laughter. Another issue with most current studies of laughter is that they do not tend to recognise the propositional content that laughter can convey (see Ginzburg et al., 2015, for discussion).

In the present study, following Ginzburg et al. (2015), we look at laughter based on the stimulus that provokes it, henceforth the *laughable*. Laughables will be analysed from two interlinked perspectives: (a) incongruity and (b) Gricean maxims.

The *theory of incongruity* explains laughter as arising from an inconsistency between the expectations of the conversational participants and some event. This has been studied extensively in theories of humour (Hempelmann and Attardo, 2011; Raskin, 1985), and offers a plausible account for the causes of humour in jokes, for example. However, although incongruity seems intuitive and offers an explanation for (some) causes of laughter, it is a vague and general notion, with incongruities being available at all levels of linguistic interaction (e.g. phonology, semantics, pragmatics). It is therefore difficult to build a computational account of incongruity as it is currently conceived. In order to offer a more fine-grained account, we assessed i) whether incongruity is recognised by naive coders and ii) whether it can be subdivided into categories corresponding to Grice’s conversational maxims (Grice, 1975).

Four of these maxims, defined by Grice (1975) as part of the cooperative principle of conversation which directs the interpretation of utterances in dialogue, can be briefly described as follows:

- Maxim of Quantity “Be exactly as informative as is required”
- Maxim of Quality “Try to make your contribution one that is true”
- Maxim of Relevance “Be relevant”
- Maxim of Manner “Be perspicuous”

Looking at a genuine example of laughter in dialogue, we now describe how flouting one of these maxims in dialogue can lead to a laughable, and the relationship to incongruity.

- (1) A: they he had to fill out some forms but I guess California might be tougher I don’t know  
 B: yeah they might be or you know how we are here in Texas it’s [laughter: like] everybody’s a hunter so **[laughter]** I’m not much of a hunter but  
 A: [laughter] yeah [noise] (Switchboard, sw2014, *discussing gun control*)

Focusing on B’s second laughter (shown in **bold**) we can see that the laughter was caused by the the utterance: “Here in Texas it’s like everybody’s a hunter”. What can be said about this laughable? Definitely, that some sort of stereotypical proposition was produced. Analysing this from a Gricean perspective we can say that B’s contribution is not true, like any other gross generalisation that ascribes all the members of a population with a single common habit. It seems that from the perspective of both dialogue participants this statement is taken to be false, i.e. it violates the maxim of quality.

In terms of incongruity, we can state that a clash between certain scripts has taken place,<sup>1</sup> namely between the “regular situation”, where not all of the population of the state are hunters and the “constructed situation”, where all the population are hunters. In this case, we can see that the incongruity itself arises because of the violation of the maxim of quality.

The functional role of the laughter here could be explained as indication by speaker B, that s/he is aware that the utterance is not literally true. The laughter of speaker A could be interpreted as showing her/his awareness of that and an acknowledgement of B’s statement.

The observation that laughter can be caused by the violation of Gricean maxims led us to develop a preliminary annotation scheme for analysing laughter in dialogue in terms of incongruities that can be sub-categorised according to these violations. Specifically we ask: (a) how different are laughters in terms of their causes and functions, (b) whether laughters are connected to violation(s) of the Gricean maxims, (c) whether laughters are caused by incongruity of some sort, (d) to what extent do people agree in their judgements regarding various features of laughables.

## 2 Annotation scheme

For our preliminary study, we randomly selected one full dialogue from The Switchboard Dialog Act Corpus (SWDA) (Jurafsky et al., 1997), 5 excerpts from other conversations in SWDA (provided with a brief context) and 5 from part of the British National Corpus (BNC), previously analysed for laughter (Mazzocconi et al., prep). SWDA consists of dyadic telephone conversations between American participants who were unfamiliar with each other on a pre-determined topic, while the spoken portion of the BNC consists of British face-to-face dialogues from a range of contexts (see Burnard, 2000, for details).

We asked participants to fill in the the following questionnaire:

- Q1 How well have you understood the given laughter? (from 1 to 5)
- Q2 Please indicate the line where the cause for laughter occurs.
- Q3 Was the laughter caused by something that the laugher says her/himself or the partner says?
- Q4 Does the cause occur before, during, or after the laughter?
- Q5 Was the laughter caused because one of the participants (from the laugher’s perspective):
  - Q5.1 gives more or less information that was needed?
  - Q5.2 gives information that was false or wasn’t supported by evidence?
  - Q5.3 gives information that was irrelevant for the discussion?
  - Q5.4 gives information that was obscure or ambiguous?
  - Q5.5 says something that clashed with a certain background information, common sense, another interpretation or another utterance?
- Q6 Please explain the cause of the laughter.
- Q7 Please explain why the person has laughed.

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<sup>1</sup> See Raskin (1985, Chapter 6) for analysis of similar content in jokes.

Q1 was provided to give a self-estimated confidence score for the following questions. Questions Q2–Q4 are about some basic properties of laughables which are usually considered to be agreed upon. Questions Q5.1–Q5.4 represent the Gricean maxims and Q5.5 explicates the notion of incongruity in way that is comprehensible for the coders. Q6 and Q7 are free form questions that give coders an opportunity to explain, respectively, the cause and the function of the laughter. We also provided coders with an example of annotation for example (1).

### 3 Preliminary results

The results that we report here are from a pilot study with 3 annotators.<sup>2</sup> While there is not enough data to calculate inter-annotator agreement, the free-form answers to Q6 regarding the cause of laughter suggest that, at least in some cases, coders understand and agree on the cause of the laughter.

- (2) Ian: [pause] basic details, name [pause] and address, telephone number,  
 John: Okay, yeah.  
 Ian: national insurance number, date of birth.  
 Ian: Erm another code number form a directory [pause]  
 John: **[laugh]** (BNC, JNW, 402–405)
- (3) Patrick: Oh if you don't think they look well then they obviously need it if they look better after they've been watered, that's what the paper says.  
 Katherine: Well then they do need water.  
 Patrick: That's the answer  
 Katherine: They [unclear]  
 Patrick: if they look as though they need it they need it but if they don't look as though they need watering don't water them.  
 Katherine: Well [pause] look, look at the birds **[laugh]** I [unclear dur=6] aren't they sweet [pause] all the same I shall buy a nesting box next er next year.  
 Patrick: Mm. (BNC, KCV, 300–305, *discussing some plants*)
- (4) B: there's an old profane expression about Texas weather,  
 B: it's always too damn cold, too damn hot, too damn windy **[laugh]**.  
 (SWDA, sw3936, 391–392)
- (5) B: and you know, I mean, a lot of people they go, they're better than the Beatles,  
 B: and I'm like you know,  
 A: [laugh].  
 B: you don't know what you're talking about.  
 A: No [laugh].  
 B: I mean, the comparison made between New Kids On The Block with the Beatles [laugh]. It was just,  
 A: You can only laugh [laugh]. (SWDA, sw2020, 822–931)

<sup>2</sup> The annotators were not native English speakers, which may mean they did not pick up on all the subtleties of the laughter and laughable. However examples in the BNC are also not necessarily produced by native speakers, and there are also cultural differences which are known to affect interpretations of humour and laughter even between native speakers (e.g. between American and British speakers of English). In future studies (see Discussion, below) we intend to involve a wide range of annotators, including native and non-native speakers of English.

In Example 2, there was total agreement on the violation of the maxim of quantity (too little information, Q5.1), and 2 out of 3 coders annotated obscurity in Ian's utterance (violation of the maxim of manner, Q5.4).

In Example 3, coders agree on the violation of the maxim of relevance by the sudden change of topic (Q5.3).

In Example 4, coders recognise incongruity against some "normal situation" (Q5.5). For Q6, regarding the cause of laughter, one of the coders wrote: "Normally a place is either too cold, or too hot, or too windy. It is hard to have all the extremes".

Example 5 is interesting, because all the coders agree that neither of laughters are caused by violation of any of the Gricean maxims. Nevertheless, the coders agree that these laughters are caused by incongruity from comparing the incomparable Beatles with a lesser band. According to the comments given by annotators, the attempt to compare any band with The Beatles seems ridiculous to both interlocutors in (5) and their laughters are driven by this.

Some of the presented excerpts show that even for humans it can be hard to describe the cause and function of laughter even when they understood the laughters quite well. Example 6 shows disagreement between the coders regarding the position of the laughable (whether it occurred before or after the laughter); the cause of the laughter (e.g. "Saying something sad about another person" vs "Being depressed of other peoples' problems, and at the same time bringing them their problems"); and its function ("Softening" vs "Marking incongruity").

- (6) A: We have a boy living with us who works for a credit card, uh, company that,  
 A: and he makes calls to people who have problems, you know, credit problems,  
 B: Huh-uh.  
 A: that are trying to work out  
 A: and, uh, [laugh]. Poor thing he comes home very depressed every night [laugh],  
 B: Oh. (SWDA, sw2883, 451–481)

## 4 Discussion and Future work

We believe that this approach, together with the precise identification of laughables in dialogue, can contribute towards an implementable account for identifying events where laughter can be appropriate, i.e. as a result of violating Gricean maxims (changes of topic, irony and sarcasm, jokes, bold statements). However, it is not the case that every violation of a Gricean maxim or incongruity in dialogue results in laughter, and we therefore believe that this kind of analysis should also be carried out more generally, with some additional account of which potential laughables in dialogue are more likely to elicit laughter (we expect this to be modulated by, for example, familiarity of dialogue participants, formality of the domain, intonation and other non-verbal cues etc). The precise positioning of the laughter with respect to the laughable may also offer clues in understanding what triggers the laughter, and help to differentiate between emotional or social causes and incongruous or humor-

ous causes (though of course, as with other features of dialogue, any given laughter event may be multifunctional) which we also intend to investigate in future work.

We intend to run similar experiments with broader coverage of examples and annotators using Amazon Mechanical Turk. Given the shortcomings of agreement calculation using chance-adjusted metrics, e.g. Krippendorff’s  $\alpha$ , for tasks such as ours, we will use a probabilistic annotation model (Dawid and Skene, 1979) that has been successfully applied to crowdsourced NLP data collection tasks, such as word sense annotation (Passonneau and Carpenter, 2014). In these tasks, as with our laughter annotation, there is no gold standard and these methods are more reliable for deriving the ground truth from the population of annotators.

We are also aware of the role of prosody and phonetic form of laughter in identifying its causes and functions, and our annotators reported that audio would have been helpful for better understanding. We therefore plan to extend our text-based samples with audio to check whether it improves inter-annotator agreement.

Our ultimate aim for this work is to implement a spoken dialogue system (for a limited domain) which can understand, produce and reason about laughter in its dialogues with users, and to demonstrate how laughter contributes semantic and pragmatic import to dialogue. This kind of system would be a proof of concept that can be used to test theoretical insights about human conversation.

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## References

- Burnard, L. (2000). *Reference Guide for the British National Corpus (World Edition)*. Oxford University Computing Services <http://www.natcorp.ox.ac.uk/docs/userManual/>.
- Chapman, A. J. (1983). Humor and laughter in social interaction and some implications for humor research. In *Handbook of humor research*, pages 135–157. Springer.
- Dawid, A. P. and Skene, A. M. (1979). Maximum likelihood estimation of observer error-rates using the em algorithm. *Applied statistics*, pages 20–28.
- Ding, Y., Prepin, K., Huang, J., Pelachaud, C., and Artières, T. (2014). Laughter animation synthesis. In *Proc. AAMS 2014*, pages 773–780. International Foundation for Autonomous Agents and Multiagent Systems.

- El Haddad, K., Çakmak, H., Gilmartin, E., Dupont, S., and Dutoit, T. (2016). Towards a listening agent: a system generating audiovisual laughs and smiles to show interest. In *Proceedings of the 18th ACM International Conference on Multimodal Interaction*, pages 248–255. ACM.
- Ginzburg, J., Breitholtz, E., Cooper, R., Hough, J., and Tian, Y. (2015). Understanding laughter. In *Proceedings of the 20th Amsterdam Colloquium*.
- Glenn, P. (2003). *Laughter in interaction*, volume 18. Cambridge University Press.
- Grice, H. (1975). Logic and Conversation. *Syntax and Semantics*, 3(S 41):58.
- Hempelmann, C. F. and Attardo, S. (2011). Resolutions and their incongruities: Further thoughts on logical mechanisms. *Humor-International Journal of Humor Research*, 24(2):125–149.
- Jurafsky, D., Shriberg, E., and Biasca, D. (1997). Switchboard SWBD-DAMSL shallow-discourse-function annotation coders manual. *Institute of Cognitive Science Technical Report*, pages 97–102.
- Katevas, K., Healey, P. G., and Harris, M. T. (2014). Robot stand-up: engineering a comic performance. In *Proceedings of the Workshop on Humanoid Robots and Creativity at the IEEE-RAS International Conference on Humanoid Robots Humanoids (Madrid)*.
- Kaushik, L., Sangwan, A., and Hansen, J. H. (2015). Laughter and filler detection in naturalistic audio. *Proceedings of Interspeech Germany*.
- Mazzocconi, C., Tian, Y., and Ginzburg, J. (2016). Multi-layered analysis of laughter. In *Proc. SemDial 2016*, Proceedings of the 20th Workshop on the Semantics and Pragmatics of Dialogue, Rutgers.
- Mazzocconi, C., Tian, Y., and Ginzburg, J. (in prep.). What’s your laughter doing there? A taxonomy of the pragmatic functions of laughter.
- Niewiadomski, R., Hofmann, J., Urbain, J., Platt, T., Wagner, J., Piot, B., Cakmak, H., Pammi, S., Baur, T., Dupont, S., et al. (2013). Laugh-aware virtual agent and its impact on user amusement. In *Proceedings of the 2013 international conference on Autonomous agents and multi-agent systems*, pages 619–626.
- Nijholt, A., Niculescu, A. I., Alessandro, V., and Banchs, R. E. (2017). Humor in human-computer interaction: A short survey. In *Adjunct Conference Proceedings Interact 2017*.
- Passonneau, R. J. and Carpenter, B. (2014). The benefits of a model of annotation. *TACL*, 2:311–326.
- Poyatos, F. (1993). *Paralanguage: A linguistic and interdisciplinary approach to interactive speech and sounds*, volume 92. John Benjamins Publishing.
- Raskin, V. (1985). *Semantic mechanisms of humor*. Synthese language library, 24. Reidel, Dordrecht.
- Scott, S. K., Lavan, N., Chen, S., and McGettigan, C. (2014). The social life of laughter. *Trends in cognitive sciences*, 18(12):618–620.
- Tahon, M. and Devillers, L. (2015). Laughter detection for on-line human-robot interaction. *Cough*, 85(65.0):0–77.
- Tepperman, J., Traum, D., and Narayanan, S. (2006). ”Yeah right”: Sarcasm recognition for spoken dialogue systems. In *Ninth International Conference on Spoken Language Processing*.

- Tian, Y., Mazzocconi, C., and Ginzburg, J. (2016). When do we laugh? In *SIGDIAL Conference*, pages 360–369.
- Truong, K. P. and Van Leeuwen, D. A. (2007). Automatic discrimination between laughter and speech. *Speech Communication*, 49(2):144–158.