S1: Codebook for scoring repair initiations in Reddit dialogue.

Alex Goddard & Alex Gillespie

London School of Economics and Political Science

Department of Psychological and Behavioural Science.

Introduction

Online dialogues are public and asynchronous written text-based communications conducted on the internet [1]. Dialogue is defined here as a Self and Other talking about an Object using a semiotic system such as language [2]. Examples of online dialogue spaces include Reddit, Twitter, Wikipedia Talk Pages, Facebook groups, and any public comment sections for any website (e.g., YouTube, Instagram, GitHub, etc.) The quality of these online dialogues are important for society, as they provide a global public forum for individuals to discuss issues of common concern and find cooperative solutions to global problems [3–5].

This codebook details the manual scoring procedure for identifying "repair initiations", defined as initiations of Other-initiated repairs [6], used in the article titled:

Conversational repairs are universal but not inevitable: Reddit dialogues usually end before misunderstandings can be resolved

The aim of this codebook was to generate a dataset of repair initiations in Reddit dialogue. The resulting dataset was then used for developing an automatic text analysis tool for identifying repair initiations (see S2). Two coders scored 500 dialogues, with 250 used to calculate inter-rater reliability

We scored 750 dialogues ensure we would meet the 100 goal, two coders scored 750 dialogues (~3,000 turns) between them. The conventional size of an inter-rater reliability subsample is 5-50% of the full coded dataset [7], and so 250 (33.33%) dialogues were double coded and used to calculate inter-rater reliability. Each coder therefore scored 500 dialogues each. The first section of the codebook provides a conceptual definition of "conversational

repairs" [8]. The second section discusses the data for which the scoring scheme was designed. The third section details the definitions of different types of repair initiations. The fourth and final section provides a Frequently Asked Questions (FAQs).

Theoretical background:

A conversational repair has three components. First, a trouble source involves a problem of miscommunication – hearing, reading, writing, speaking, etc. – and misunderstanding that arises in the dialogue [8]. Second, an initiation involves a participant alerting other speakers to the trouble source. Third, a completion involves a participant addressing the misunderstanding or miscommunication. The initiation and completion can be within the same turn (produced by one speaker) or distributed across two turns (produced by two speakers). A repair can be initiated by either the person whose statement caused trouble in the dialogue (Self) or another person who noticed the trouble (Other).

There are four types of repair depending on who is initiating and completing the repair (table 1). Self-initiated Self-repairs involve the person responsible for the trouble source initiating and completing a repair in the same turn. The repair can be in the same turn as the trouble source, known as "Self-repair" [8], or after the Self notices a problem in the Other's response to the trouble source, known as "Third turn repair" [9]. Other-initiated Self-completed repairs involves a trouble source in the first turn, the Other requesting clarification on the trouble source in the second turn (initiation), and the Self responding to the request in the third (completion). Self-initiated Other-repair involves the Self asking for help in clarifying a trouble source in the first turn (initiation) and the Other responding in the second turn (completion). Other-initiated Other-repair involves the Other both initiating and completing a repair in the second turn following a trouble source.

Table 1 – Repair Self/Other Initiation/Completion matrix.

Completion	Initiation	
	Self	Other
Self	Self-initiated Self-repair	Other-initiated Self-repair
Other	Self-initiated Other-repair	Other-initiated Other-repair (other repair).

This typology of repairs is well established and has been successfully operationalized for content analytic scoring of face-to-face dialogues [6,10,11]. Several subtypes of the four general repair categories have also been identified in the literature. For instance, "self-repair" and "third turn repair" are subtypes of Self-initiated Self-repairs [9] that vary in how they are distributed across dialogue turns. Self-repairs are initiated and completed in the same turn as the trouble source while third turn repairs are completed two (or more) turns after the trouble source.

Because online dialogues are text-based, they allow for repair subtypes that are unique to the medium [12]. For instance *-repair [13] is the act of using an asterisk symbol to correct yourself (Self-initiated Self-repair) or others (Other-initiated Other-repair). For a Self-initiated Self-repair, a speaker may wish to clarify their point after having already posted and commented on something (e.g. Self: I thought dogs didn't howl; Self: cats* not dogs). For an Other-initiated Other-repair, a speaker might correct another's spelling or grammar mistake (e.g., Self: I love dogz; Other: dogs*).

In this codebook, we provide instructions for scoring repair initiations (of Other-initiated repairs) in Reddit dialogue [11]. We do not score for self-repairs as these are impossible to estimate accurately in online dialogues without information about participants'

writing behaviours before publishing a turn [12]. In other words, participants will often make mistakes during writing and correct themselves before making the turn visible. We chose to not code for Other completed repairs as we were unable to reach acceptable inter-rater reliability in pilot scoring (< 0.50) for the codebook. Finally, we initially scored dialogues for third turn repairs, but these were dropped from the final analysis due to low inter-rater reliability.

Target data

This codebook was designed for scoring dialogues conducted on Reddit but maybe applicable for scoring online dialogues more broadly. Reddit is a social media platform comprised of smaller "subreddits" with their own sets of rules, norms, and topics of discussion [14]. Subreddits are structured around posts and comments. Posts can involve posting external media content (e.g., YouTube videos, memes, images, etc.) or simply pure text. Commenters then "reply" to the post (and subsequently to each other) in a reply tree.

A reply tree is so-called as posts and comments can have multiple direct replies that branch off into different conversation threads. Figure 1 shows a graphical representation of a Reddit reply tree. There are eight conversation threads contained with the reply tree, each of four turns in length. Each of these threads begin at the post and end at the final reply of a branch. In the highlighted thread, the first turn is the post, the second reply 1, the third reply 4, and the fourth reply 9. In this codebook, we consider a single branch as a "dialogue" because it involves a linear turn-taking process between participants. This is a limitation as a thread is only a sample of the wider reply tree that is the self-contained interaction space. However, scoring threads is much more straightforward due to their similarity to face-to-face dialogues.

Figure 1: Reply tree conversation structure on Reddit
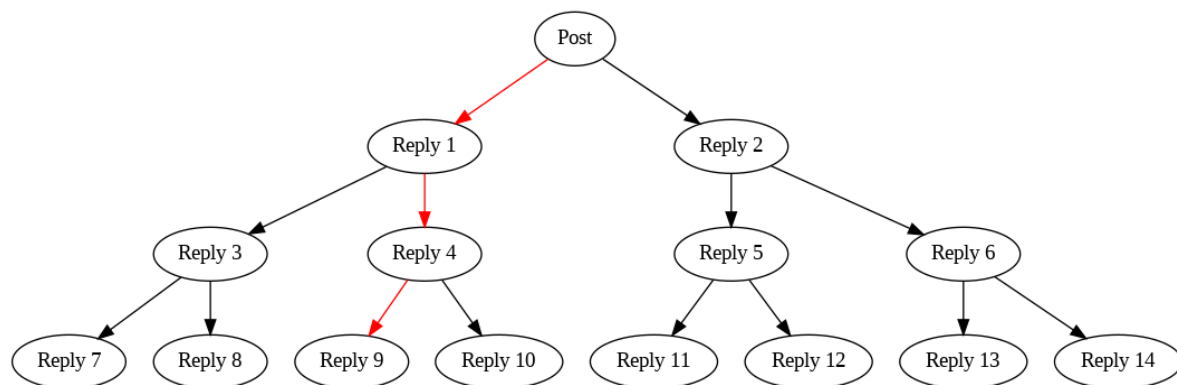
Scoring procedure

Because repairs require multiple turns to identify [8], coders were instructed to read the dialogue and score for repair initiations where appropriate. A post (turn=1) was never scored for initiations as, by definition, the first opportunity for Other-initiated repair initiations are the second turn. A repair initiation is defined as any evidence of the Other asking the Self to clarify their intended meaning [11,15]. It is therefore both an indicator that the Other has misunderstood and an invitation for the Self to clarify the trouble source. Repair initiations are requests for clarification on another's perspective and should not be confused with new information questions, which ask the Self to answer a question about something other than their previously uttered perspective on a subject. For instance, "What's the capital of Germany?" is eliciting new information while "Did you mean Berlin?" is seeking clarification.

There are three types of clarification requests that indicate a repair initiation [11]: *open request, restricted requests,* and *restricted offers* (table 2). These vary by their level of specificity, with open requests providing no information about the specific area that an Other

has misunderstood, restricted requests highlighting a specific area of misunderstanding, and

restricted offers providing a possible solution.

Table 2: Other-initiated repair typology (Dingemanse et al., 2015)

Other-initiated repair type	Definition	Indicated by	Examples
Open request	When the Other is non-specific about what they've misunderstood in the Self's turn.	Confusion words (e.g., "huh"). The phrases *why, what,* and *how* without further context (e.g., "wtf?")	"huh?" "sorry?" "wtf?" "I don't get it."
Restricted request	When the Other is specific about what they've misunderstood in the Self's turn.	Questions starting with *why, who, what, when where, how, which.* Reference to what the Self said (i.e., not asking for new information).	"Sorry, which cat?" "Where was this?" "What does "howl" mean?" "I don't understand what you meant by "howl"".
Restricted offer.	When the Other offers a possible solution to their misunderstanding as well as requesting clarification.	Questions starting with "Did you mean" or other reference to Self's intended meaning. Statements posed as questions.	"Did you mean to say meow instead of howl?" "The *cats* were howling?" "I'm assuming you mean meow?"

An open request involves the Other alerting a Self to a misunderstanding without

specifying what it is they've misunderstood. These repairs are indicated by ambiguous

statements of misunderstanding ("I don't understand"; example 1) or questions without an

obvious object ("Huh?"; example 2). Open requests are the least specific type of clarification

requests.

Example 1: Open request (1)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	Don't get it.	Initiation	Other asks for a clarification of the word howl.

Example 2: Open request (2)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	What?	Initiation	Other asks for a clarification of the word howl.

A restricted request involves the Other alerting and asking the Self to clarify an overt trouble source. It is indicated either by a clarifying question (e.g., "What do you mean by X?", "Where did this happen exactly?"; example 3) or a statement that refers to what the Other said in the previous turn or a statement of misunderstanding (e.g., "Don't get what you mean by X."; example 4). Unlike open requests, restricted requests provide information about what the Other has specifically misunderstood.

Example 3: Restricted request (1)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	What do you mean by howl?	Initiation	Other asks for a clarification of the word howl.

Example 4: Restricted request (2)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	I don't understand what you mean by "howl".	Initiation	Other states misunderstanding.

A restricted offer involves the Other requesting clarification whilst also providing a possible solution. This could be in the form of an if/or question (e.g., "When you said home, did you mean here or your parents' place?"; example 5), a phrase stated as a question (e.g., "At work?", "The house next door?"; example 6), or a question related to the Self's assumed meaning (e.g., "I assume you meant home?"; example 7). Restricted offers are the most specific clarification request. Unlike open and restricted requests, restricted offers are only phrased as questions because, otherwise, it would indicate an Other-initiated Other-repair, not an Other-initiated Self-repair (e.g., example 7 with a full stop instead of a question mark).

Example 5: Restricted offer (1)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	Do you mean literally "howl" or more a "howl like sound"?	Initiation	Other offers a possible solution.

Example 6: Restricted offer (2)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	Meow like a howl?	Initiation	Other offers a possible solution.

Example 7: Restricted offer (3)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	I assume you mean a meow that sounds like a howl?	Initiation	Other offers a possible solution.

It is possible for repair initiations to contain all three types of clarification requests. In the case of a turn with two types of clarification request, coders should score for the most specific type. For instance, if a turn contains an open request and restricted offer. For instance, the turn "Huh? Surely you mean dogs?" should be coded as a restricted offer as the open request "Huh?" is no longer non-specific given the restricted offer "surely you mean dogs?".

Clarification requests can sometimes be used to perform a rhetorical action that may not have been intended by the speaker as a request for clarification. For instance, as with face-to-face interactions, requests like "really?" or "what the hell?" can be used to emphasize a particular perspective. In this codebook, we still score these instances as clarification requests when they are addressed at something the Self has said. This is because they always allow the Self to interpret the question as genuine, thereby completing an Other-initiated Self repair sequence (example 8).

Example 8: Rhetorical clarification request (1)

Turn	Speaker	Example text	Repair components	Rationale
1st	Self	Cats can howl.	Trouble	Self makes a confusing statement.
2nd	Other	Seriously? You expect me to believe that? I find that very hard to believe.	Initiation	Other uses an open request to illustrate their disbelief at the Self's initial statement.
3rd	Self	Seriously. They can howl.	Completion	Self addresses the disbelief by answering the rhetorical clarification request.

Scoring protocol summary

Each dialogue is presented to the participant independently and in ordering of the reply tree. In practice, this involved separating data frames or spreadsheets for every

individual dialogue thread. For Reddit dialogues, we presented dialogues in a data frame modelled in the style of table 3. The table includes a Speaker, Turn, and Text column denoting who is speaking, what they've said, and who they are replying to, as well as two columns for scoring each turn for clarification requests (CR).

Table 3: Suggested matrix structure for scoring repairs in Reddit dialogues.

Speaker	Turn	Text	Clarification requests
A	1	Post text	
B	2	Comment 1	Restricted request
A	3	Comment 2	

Tables 4 provides an overview of scoring repair initiations through the three types of clarification request. Each details when to code and not to code for the variable in a turn. These summarize the previously stated definitions and examples from this section. When scoring for ambiguous clarification requests – e.g., it is unclear whether a question is seeking new information or clarification – coders were conservative, airing on the side of *no repair* rather than a repair.

Table 4 – Scoring protocol clarification requests.

Repair type	Sub-type (scoring category)	Code for when:	Do not code for when:
	Open request	Is a second turn (Self-Other). AND: Turn contains confusion words (e.g., "huh"). OR Turn contains *why, what,* and *how* questions without further context (e.g., "wtf?").	The question is reported speech (e.g., "so I was like, "huh?").
Clarification request	Restricted request	Is a second turn (Self-Other). AND: Turn contains questions starting with *why, who, what, when where, how, which*. AND/OR Turn makes reference to what the Self said (i.e., not asking for new information).	The question is reported speech OR: The question is asking for new information (not clarification).
	Restricted offer	Is a second turn (Self-Other). AND: Turn contains questions starting with "Did you mean" or other reference to Self's intended meaning. OR: Turn contains statements posed as questions.	The question is reported speech OR: The question is asking for new information (not clarification).

An important point is that individuals can use clarification requests to serve a rhetorical purpose in dialogue, for instance: "Why would you do something like that? That's awful.". The question implies that the speaker disagrees with the addressee's action. This is confirmed by the follow up sentence ("That's awful"). In this case, the question was scored for as a clarification request as it the addressee can choose to reply if they so desire and complete the repair sequence.

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