

Annotation guideline for NOXI corpus

1. Introduction

1.1. Objectives & Corpus Description

Objectives: Annotate the Other-initiate Repair sequence in the NOXI corpus [1].

Noxi corpus:

- Duration: ~7 hours of recording, 21 dyadics * ~20' per dyadic
- Corpus scenario: two interlocutors talk to each other (while standing) via screen in an expert-novice knowledge sharing context, one interlocutor plays the role of “**expert**”, the other interlocutor plays the role of “**novice**”. To obtain spontaneous dialogues on multiple topics that participants are passionate about/know of, pair matching is set up as follows:
 - In recruiting, the potential experts proposed one or more topics that they are passionate about or knowledgeable in
 - The novices were then asked to choose among the experts' topics for pair matching (topic of interests matching)

1.2. Definition & Terminology

Other-initiated Self-repaired, or **Other-initiated Repair (OIR)**, refers to the practices in interaction where a recipient interrupts the ongoing conversational activity to address possible trouble in speaking, hearing, or understanding, but leaves it to the speaker of the trouble source to accomplish the actual repair [2, 4].

The minimal OIR sequence contains a three-turn exchange, including:

- **Trouble Source segment (T-1):** a segment (of the Trouble Source speaker's turn) that is retrospectively treated as problematic by the recipient. This is not inherently a "trouble," but becomes one through the next turn's response.
- **Repair Initiation segment (T0):** the segment in which the recipient flags a problem in the Trouble Source. Because it treats the previous speaker's turn as problematic or containing trouble, the previous turn is considered to contain a Trouble Source segment.
- **Repair Solution segment (T+1):** the segment where the trouble is resolved by the Trouble Source speaker

To be considered as an OIR sequence, a **Repair Initiation** must be preceded by a **Trouble Source** (the recipient treats it as an issue/trouble) and followed by a **Repair Solution** (the trouble source speaker acknowledges the request from the recipient).

→ IMPORTANT: STICK AS MUCH AS POSSIBLE TO THE PARTICIPANT'S POINT OF VIEW

An OIR sequence can expand beyond its minimal form to become a more complex non-minimal sequence. However, they are quite challenging to code and analyze because the Repair Solution for one Repair Initiation can become the Trouble Source for the next Repair Initiation, which leads to the same data point appearing multiple times in the analysis later. To handle this, we use the following coding approach:

- For minimal OIR sequences, we code all three components: T-1, T0, T+1
- For non-minimal OIR sequences (including embedded OIR sequences), we code:
 - using letter (a), (b), ..etc to mark each OIR sub-sequence per each main OIR sequence
 - For the embedded OIR sequences, where the Repair Solution T+1 becomes the next Trouble Source T-1, we code it with 2 labels **T+1_a** (repair solution of OIR sub-sequence (a)) and **T-1_b** (trouble source of OIR sub-sequence (b)).
- See examples will be given in Section [3.3](#), [3.4](#)

1.3. Annotation tool & Brief annotation process

Tool: ELAN (<https://archive.mpi.nl/tla/elan>)

ELAN is an annotation tool for multimodal annotation on video and audio recordings.

The annotator will be provided with an annotation template for each dyadic, including video, audio recordings, transcriptions, and pre-defined layers (tiers) for annotation.

Different resources/types of evidence used during coding:

- Speech productions (what speakers say and how they say it)
- Non-verbal behaviours: co-speech gestures, eye gaze, head movement, facial expression

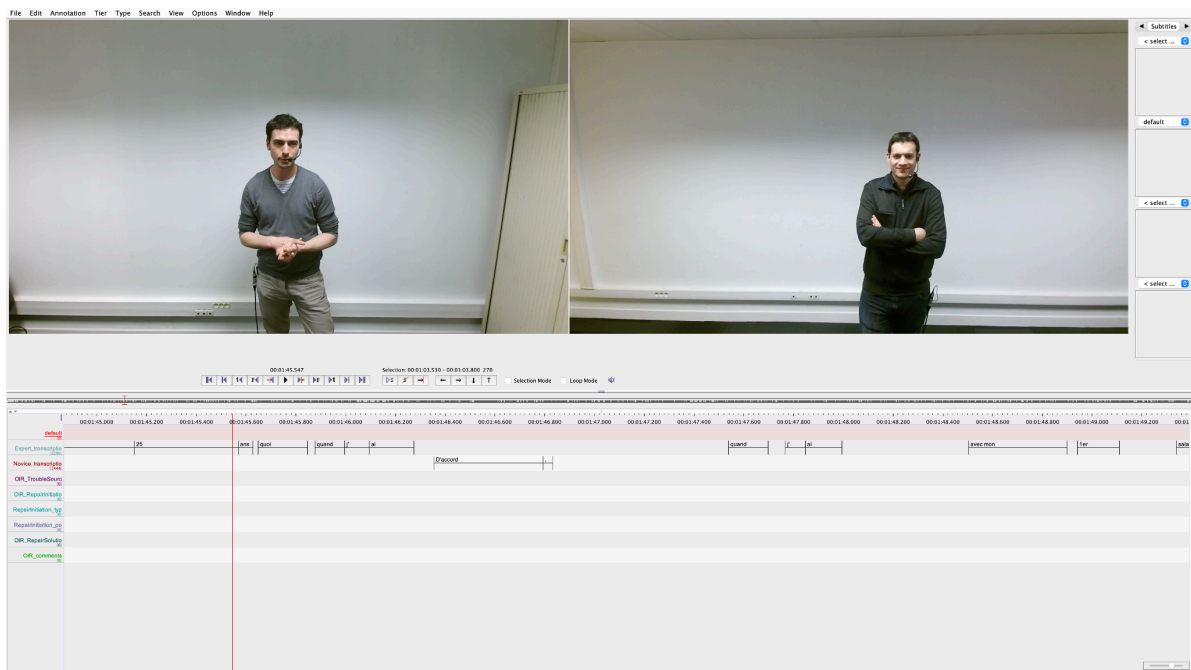
Unit of annotation

- Default unit: segment-level
- Annotator annotates segment by segment (use punctuation “.”, or “?”, “...” as clues for boundaries)

Overview of annotation process:

- Annotator is given an ELAN template for each dyadic (linked to audios, videos, and predefined tiers)
- The annotator reads the transcription sequentially, listens to the audio, and watches the video
- Decide if a segment functions as one of the components: Trouble Source, Repair Initiation, Repair Solution, or Non-OIR (there is no other-initiated repair)

- A component corresponds to one single segment or spans over multiple segments (same boundaries)
- For Repair Initiation: annotate its types (Open request, Restricted request, or Restricted offer, more detailed in Sections 2 & 3)



Overview of ELAN annotation template

2. Coding template

Based on the coding schema from [2, 3].

Tier	Controlled vocabulary	
OIR_TroubleSource	<ul style="list-style-type: none"> · T-1 · undecided 	Mark as “T-1” if the segment contains the trouble that triggers the repair initiation. <i>In case of non-minimal OIR sequences, we mark each sub-sequence Trouble Source by letters, for eg: T-1_a, T-1_b, T-1_c,...</i>
TroubleSource_type	<ul style="list-style-type: none"> - Mishearing - Non-understanding - Others 	
TroubleSource_problem	<ul style="list-style-type: none"> · trouble · undecided 	Annotate the minimum span (one or a span of multiple words) in the OIR_TroubleSource segment, which is the reason for making it a Trouble Source segment

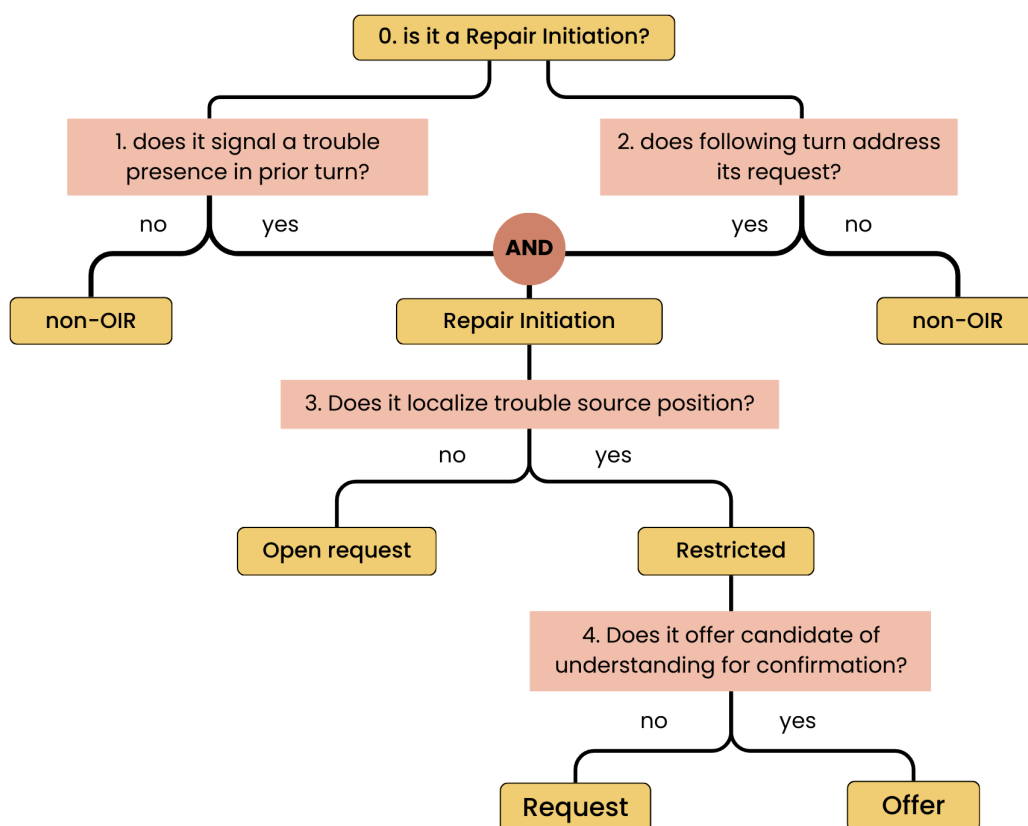
OIR_RepairInitiation	<ul style="list-style-type: none"> · T0 · undecided 	Mark as “T0” if there is a repair initiation request <i>In case of non-minimal OIR sequences, we mark each sub-sequence Repair Initiation by letters, for eg: T0_a, T0_b, T0_c,...</i>
RepairInitiation_type	open_request	An expression that requests clarification of a prior turn, <u>leaving open where or what the problem is</u> . Often an interjection or ‘What?’-like form, typically results in repetition.
	restricted_request	An expression that requests specification or clarification, <u>restricted to a specific element of the trouble source</u> . Often includes WH-question word and/or repetition.
	restricted_offer	A polar question that <u>offers a candidate understanding and invites confirmation or correction</u> in the next turn. Can include repetition and/or new material.
	undecided	
OIR_RepairSolution	<ul style="list-style-type: none"> · T+1 · undecided 	Mark as “T+1” if the segment contains the solution that acknowledged the prior repair initiation <i>In case of non-minimal OIR sequences, we mark each sub-sequence Repair Solution by letters, for eg: T+1_a, T+1_b, T+1_c,...</i>
Non-OIR	<ul style="list-style-type: none"> - Non-OIR - undecided 	Only the difficult cases, like in the examples: - Case 1: It contains a similar format as OIR: question form, repetition -> not signal something in the other speaker’s prior turn, being trouble for the current speaker (for eg: question for more information, ..) - Case 2: the recipient signals the trouble, but the trouble source speaker doesn’t acknowledge it (address the repair request)
OIR_Comments		Free notes by annotator (if any, optional)

OIR_seq_id		ID number for each OIR sequence, eg: 1, 2, 3,..
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***How to use ‘undecided’:**

- Can be used temporarily during coding when uncertain (to later return to)
- In the final coding set for inter-rater reliability
- Use of ‘undecided’ should be minimized as much as possible

3.Coding Instructions



Decision tree to decide if a given sentence is an OIR_RepairInitiation

An OIR sequence must have three components, including: Trouble Source, Repair Initiation, and Repair Solution, in which Repair Initiation must be produced by different recipients rather than Trouble Source and Repair Solution. To annotate these components, answer:

0. Is there a Repair Initiation?

To answer if there is a Repair Initiation, the annotator must answer two sub-questions:

1. Does it signal a trouble presence in the prior turn?

- If NO, mark as non-OIR
- If YES, answer (2).

2. Does the following turn address its request

- If NO, mark as non-OIR
- If both (1) and (2) are YES, it is the Repair Initiation. Label three corresponding components: Trouble Source, Repair Initiation, and Repair Solution.

3.1. How to consider if a prior turn is treated as problematic or not? (Answer 1)

- Cases where the Repair Initiator offers or requests additional information that goes beyond what the Trouble Source Speaker has already said.
 - These cases can be repaired, but tend to be similar to a) 'regular' requests for information or b) demonstrations of understanding
- Characteristics that make it more Repair Initiation-like:
 - interrogative question format
 - question intonation
 - singling out a specific part of/addressing partner's prior turn through:
 - linguistic tying (e.g., with demonstratives "that", "these")
 - repetition (with modification, rephrasing) of speech or gesture
 - increment (continuation of prior turn)
 - using markers or hedging
 - hearably incomplete
 - speaker appears to expect a response from partner (e.g., gaze towards partner)
- Characteristics that make it less repair-like:
 - declarative format
 - turn-initial particles that signal confirmation or now-understanding (mostly 'yes', 'd'accord', or 'oh')
 - turn design features suggesting certainty (declarative prosody, hearably complete)

3.2. How to consider if the following turn addressed the Repair Initiation request or not? (Answer 2)

- If Trouble Source Speaker does not respond (so if there is no Repair Solution), then it is NO
- If Trouble Source Speaker does respond (through clarification or confirmation in line with the current request), then it is YES

3.3. Coding Repair Initiation Types

To decide the type of Repair Initiation, answer:

3. Does it localize the Trouble Source position?

- If NO, it is Open Request type
- If YES, it is Restricted type and go to question (4)

4. Does it offer a candidate of understanding for confirmation?

- If NO, it is Restricted Request type
- If YES, it is Restricted Offer type

Open Request

Dataset-exemplary example (Example 1, pair4, 00:16:22:00:16:28)

(1) **Expert:** *Donc il faut, et puis du coup...*

(So you have to, and then...)

(2) **Novice:** En moto ça doit être bien, non ? —> |Trouble Source, T-1|

(On a motorbike that must be nice, right?)

(3) **Expert:** Pardon ? —> |Repair Initiation, T0|

(Sorry?)

(4) **Novice:** En moto ça doit être bien ? —> |Repair Solution, T+1|

(On a motorbike that must be nice?)

(5) **Expert:** En moto ça doit être très sympa.

(On a motorbike that must be really nice.)

- In turn (3), the Expert asked “Pardon” with question intonation, which is often a polite interrogative without any reference to a specific issue to signal a hearing or understanding trouble of the Novice's prior turn (2).
- Then, in (4), the Novice repeats the previous utterance in (2) almost exactly - a common way to address a Repair Initiation request.
- Finally, in (5), the Expert accepts and confirms the repair solution given by the Novice.

—> this sample contains an OIR sequence and (3) is a Repair Initiation in type **Open Request** as it is a general question, not targeting a specific entity.

Restricted Request

Dataset-exemplary example (Example 2, pair1, 00:02:52:00:02:56)

(1) **Expert:** ...Soit et c'est surtout de ça dont je vais parler de faire du Light painting.

Je sais pas si tu connais ? —> |Trouble Source, T-1|

(Right, and it's mainly that that I'm going to talk about doing light painting. I don't know if you know it?)

(2) **Novice:** De la quoi pardon ? —> |Repair Initiation, T0|

(The what sorry?)

(3) **Expert:** Du Light painting. —> |Repair Solution, T+1|

(Light painting.)

- In (2), the novice uses a fragment of repetition “de la” + a wh-word “quoi”, which directly targets to a specific element of the prior turn (1) from Expert, signalling trouble related to “de faire du...”. “pardon” is also a common practice in Repair Initiation, showing politeness when interrupting -> turn (2) of Novice signals potential trouble in (1)
- In (3), the Expert acknowledges the request from Novice in (2) by repeating “Du Light painting” -> the term that was unclear for the Novice is clearly restated -> there is repair solution in (3)

—> there is an OIR sequence in this example, and as in (2), the Novice requests a clarification on unclear information -> it’s not an offer for candidate of understanding -> it is Repair Initiation in **Restricted Request type**.

Restricted Offer

Dataset-exemplary example (Example 3, pair13, 00:11:32:00:11:52)

(1) **Expert:** Et après il s’est cassé, il s’est cassé. Et là ils ont fait... enfin, ils ont changé, ils étaient plus pop... plus pop disons. Mais trop bien aussi je trouve, sans Syd Barrett. Après il est... —> |Trouble Source, T-1|

(And then he left, he left. And then they made...well, they changed, they became more pop... more pop, let’s say. But still really good, I think, without Syd Barrett. After that, he...)

(2) **Novice:** Ouais, il y a eu un changement de leader en fait au final c’est... Et c’est pas une histoire avec le bassiste ou quelque chose comme ça qui ? —> |Repair Initiation, T0|

(Yeah, there was a change in leader actually in the end it’s...Isn’t it something with the bassist or something like that...?)

(3) **Expert:** C’est... c’est Waters Roger Roger Waters? —> |Repair Solution, T+1|
(It’s... it’s Waters Roger Roger Waters?)

(4) **Novice:** Roger Waters voilà c’est ça .
(Roger Waters right that’s it.)

- In (1), the Expert mentioned “a change” (topic is about music and they are talking about Pink Floyd band) and let the turn end with incompleteness while mentioning “he”, which is a vague referent -> potential Trouble Source
- In (2), the Novice completes the Expert’s talk in (1) by offering his understanding about the “change in leader” (target about the specific element of change in (1)) and about the “bassist”. The use of “something like

that..” (showing uncertainty) with question intonation shows an invitation for confirmation or correction from the Expert

- In (3), the Expert confirms and clarifies that the referent about the bassist is “Roger Waters”, acknowledging the request for confirmation in (2)
- Finally, in (4), the Novice accepts the solution given by Expert in (3)

-> there is an OIR sequence in this example, and as in (2), the Novice proposes his candidate of understanding to invite the Expert to correct/confirm -> it is Repair Initiation in **Restricted Offer type**.

3.4. (Extended) Reasoning for non-OIR cases

To analyze human reasoning behind the non-OIR cases (for later comparison with LLM reasoning), mark the non-OIR sequences with the reason why they are considered as non-OIR by the following categories:

- (1) Not signalling trouble
 - (1-3) Question form, but not a request for repair
 - (1-4) Repetition format, but not a request for repair
- (2) Lacking a repair solution

4. Some Difficult Cases

Non-OIR

Dataset-exemplary example (Example 4, pair1, 00:02:55:00:03:02)

- (1) **Expert:** Du Light painting.
(*Light painting.*)
- (2) **Novice:** light painting non je connais pas.
(*Light painting no I don't know it.*)
- (3) **Expert:** En fait c'est une technique de photo qui est assez amusante.
(*Actually, it's a photo technique that's quite fun.*)

- In (2), the Novice uses fragment repetition of “Light painting”, which might look similar to the format of a Repair Initiation, showing that there might be trouble in (1) from the Expert with the term “Light painting”. However, the Novice continues by “non je connais pas”, which is a statement of not knowing that term (statement of epistemic status) rather than asking for a repair solution from the Expert.
- Also, in (3), the Expert continues by giving more information about “Light painting” technique, but this explanation comes unprompted, or possibly from the Expert's topic continuation.

—> there is no Repair Initiation in this sample -> **non_OIR**

Example from the subset of CABB (translated into English by DeepL)

(1) **B:** uh this one has like a table on top with t- two uh (+iconic gesture)

(2) **A:** two legs

(3) **B:** yeah

- In (1), speaker B implicitly invites speaker A to complete while searching for the right word (using gestures while searching for the word)
- In (2), speaker A is not halting the conversation to signal a problem with hearing or understanding, but rather completing speaker B's turn (giving a solution for B's invitation) -> not treating (1) as containing trouble for A

→ **non-OIR**, but rather similar to Self-initiated Other-repaired (trouble source speaker signals his trouble and asks for a repair solution, and the partner provides the repair solution)

References

- [1] Angelo Cafaro, Johannes Wagner, Tobias Baur, Soumia Dermouche, Mercedes Torres Torres, Catherine Pelachaud, Elisabeth André, and Michel Valstar. 2017. *The NoXi database: multimodal recordings of mediated novice-expert interactions*. In *Proceedings of the 19th ACM International Conference on Multimodal Interaction (ICMI '17)*. Association for Computing Machinery, New York, NY, USA, 350–359. <https://doi.org/10.1145/3136755.3136780>
- [2] Dingemanse, Mark & Enfield, N.. (2015). *Other-initiated repair across languages: Towards a typology of conversational structures*. *Open Linguistics*. 1. 96-118. 10.2478/opli-2014-0007.
- [3] Rasenberg, M., Pouw, W., Özyürek, A. et al. *The multimodal nature of communicative efficiency in social interaction*. *Sci Rep* 12, 19111 (2022). <https://doi.org/10.1038/s41598-022-22883-w>
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- [5] Barbara A. Fox, Trevor Benjamin, Harrie Mazeland. *Conversation Analysis and Repair Organization: Overview*