Towards A Multi-Dimensional Taxonomy Of Stories In Dialogue

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Abstract

In this paper, we present a taxonomy of stories told in dialogue. We based our scheme on prior work analyzing narrative structure and method of telling, relation to storyteller identity, as well as some categories particular to dialogue, such as how the story gets introduced. Our taxonomy currently has 5 major dimensions, with most having sub-dimensions - each dimension has an associated set of dimension-specific labels. We adapted an annotation tool for this taxonomy and have annotated portions of two different dialogue corpora, Switchboard and the Distress Analysis Interview Corpus. We present examples of some of the tags and concepts with stories from Switchboard, and some initial statistics of frequencies of the tags.

Keywords: Story, Narrative, Identity.

1. Introduction

Stories have long been recognized to be an important part of many genres of dialogue, including casual conversation (Sacks, 1992; Labov and Waletzky, 1967; Polanyi, 1985). Previous analyses have explored the structure of the narrative, e.g., (Labov and Waletzky, 1967), how stories are introduced and co-constructed in dialogue (Sacks, 1992; Jefferson, 1978), and how stories relate to cultural identity (Polanyi, 1985). Schank describes some dimensions toward classifying stories with respect to retrieval (Schank, 1991). In this paper, we introduce a taxonomy of stories that can be used for classifying and annotating how stories are told in dialogue. Our ultimate goals are to be able to automatically recognize aspects of stories and be able to retrieve and re-tell stories in appropriate places in dialogue. The taxonomy includes multiple dimensions relating the story and the way it is told to the narrator and dialogue function. We have used this taxonomy to annotate several dialogue corpora, and we report some preliminary results from the Switchboard corpus (Godfrey and Holliman, 1993).

2. Corpora

The Switchboard: Telephone Speech Corpus for Research and Development corpus was collected between 1990 and 1991. It was sponsored by DARPA and collection was automated and completed by Texas Instruments. It was collected for use in research. Some possible areas of study on the corpus suggested at time of publication were speaker verification and large vocabulary speech recognition (Godfrey et al., 1992).

Since its collection, the Switchboard corpus has been released several times with updated annotations. It has additionally been used by researchers for a wide range of speech annotation projects. The release of the corpus which we use in our study had been previously annotated by dialogue act. Although these annotations sometimes correspond with our use of the corpus, we primarily annotate the corpus on a higher level, with multiple utterances in each block. Our goal was to identify groups of utterances by a single speaker which constituted a story.

3. Identifying stories

Identification of stories to be annotated by this scheme is based on Labov's narrative structure (Labov and Waletzky, 1967), which categorizes dialogue acts as structural components. For our purposes, the structural components considered are

orientation – expository or setting information,

action – temporally ordered narrative clauses, and

evaluation – embedded speech, evaluative commentary, and other non-narrative related discussion.

Any passage of dialogue that contains at least two action clauses/events, or an action clause and another element of narrative structure (which is presented in a narrative style) should be annotated as a story. Stories identified often have ambiguous boundaries, and so using Labov's structure as reference helps distinguish story elements from non-story dialogue contributions.

4. Annotation Scheme

4.1. Previous Work

Schank discusses some possible categorizations of stories in a more general sense (Schank, 1991). One method he discusses is type based on source: stories can be official, invented or adapted, firsthand experiential, secondhand, or culturally common. Another categorization was based on intention: stories could be told to fulfill "me goals" (telling a story for attention, satisfaction, self-description), "you goals" (how a storyteller feels about the effect the story can or does have on the listener), or "conversational goals" (towards the effect the story has on the conversation itself).

4.2. Current Scheme

We expanded and further defined the categories described by Schank, then developed further categories generalizable across all narratives. The five dimensions and their subdimensions that constitute the scheme are outlined in Figure 1, and described in more detail below.

1. **Narrative Point of View**
   (a) **Number:** Singular, Plural, Mixed
   (b) **Person:** First person, Second person/generic, Third person, Mixed
2. **Story Presentation**
   (a) **Specificity:** Specific incident, Hypothetical incident, Habitual incident, Vague
   (b) **Truth Value:** True story, Adapted story, Invented story, Vague
3. **Orientation in Dialogue**
   (a) **Source:** Firsthand, Secondhand, Culturally common, Official, Vague
   (b) **Function in Dialogue:** Answer a question, Mirror story response, Support claim/statement, Refute/repair claim/statement, Transition story relevant to overall dialogue, Elaborate/continue previous story/statement, Vague
4. **Identity**
   (a) **Explicit Identity:** Explicit/Relevant Identity, Unspecified/Irrelevant Identity
   (b) **Identity:** List (tags) If explicit, annotate what identity the speaker holds and is relevant based on the corpus.
   (c) **Identity Testimony:** Story supports Identity, Identity enhances Story, Neutral/Mixed
5. **Affect:** Emotionally Relevant, Emotionally Irrelevant, Vague

Figure 1: Story Taxonomy

4.2.1. Narrative Point of View

Narrative point of view focuses on the relationship of the narrator to the protagonist(s) - the main character(s) or group from whose point of view a story is told. First, a determination of the main character(s) is made. The starting point is characters whose actions and internal states are described. Any character whose internal state (thoughts, feelings) is shown is a point of view (POV) character. If only external states of the characters are shown, all main characters in the story are POV characters. The subcategories of narrative POV are *number* and *person*, and describe the relationship of the narrator to the POV character(s). *Number* describes how many characters' POVs are shown in a story. Number can be singular, plural, or mixed, and relates to the grammatical number of the description of the protagonist. *Mixed* is used when both singular and plural descriptions of protagonists are used. *Person* describes the relationship of the narrator to the protagonist and relates to the grammatical person of descriptions of the protagonist: first, when the narrator is the protagonist, third when the protagonist is someone else, and second when the protagonist is either the addressee or a generic protagonist.

4.2.2. Story Presentation

The *story presentation* dimension considers how the story is to be understood as relating to actual events. Its subdimensions include categorization of event type (*specificity*), and the veracity of the story as presented (*truth value)*. *Specificity* describes the type of event arc described in the story: a specific incident, a hypothetical incident that could happen, or something that recurs habitually.

A specific/actual incident story is contrastive with a hypothetical incident: one has occurred, and one could occur, respectively. This is separate, however, from fictional stories, which are accounted for in the *truth value* category. Specific/actual incident stories are also contrastive with habitual incident stories in that specific stories are situation-dependent, while habitual stories are confined to a defined time period. If a story's events are repeated over a period of time defined by context or within the story, it is habitual. If the events are independent of a time period, the story is specific incident. Longer narratives can include sections with several of these types. These can be annotated as mixed specificity. The vague categorization is primarily for stories with missing context, as in most subdimension's vague categories.

The story in Figure 2 is an account of a specific isolated chain of events. The last three lines form a sort of sub-story that is more of a script, but in the given context, this script is understood to have occurred in the same chain of events. The other annotations of the story in Figure 2 include first person, singular, firsthand, irrelevant identity, emotionally relevant, true, and supporting a claim/statement.

In Figure 3 we show an example of a habitual incident story. The story is describing a situation that is generalizable to the time period between speaker B's sister's move and the time of speaker B telling the story. The story shown here is not annotated as specific because it is not a description of a repeated chain of events in a situation, but rather a description of a situation dependent on the time period as marked by the story's first event.

This story's other annotations include singular, third person, answer a question, relevant identity, neutral identity testimony, true, and vague source. The relevant identity is *mother*

Truth value, has categories true story, adapted story, invented story, and vague. The true and invented categories cover groups of stories presented as truth or fiction, respectively. This does not account for lies, exaggerations, or lapses of memory: a story with one of these elements can still be presented as truthful. Adapted stories present an adapted account of a true series of events.

Figure 4 is an example of an adapted story. This type of story is most often a generic or script story that cannot be told as an exact duplicate story for every instance, but instead is a general arc that is close to the truth. If a story is told with the understanding that it is a generalized account of a type of situation, rather than one instance of that situation, it is adapted. In both of the sub-dimensions described, a story's classification as vague indicates ambiguity or missing information or context.

This other annotations for the story in Figure 4 include plural number, third person point of view, specific incident,

B.utt1: – but, uh, I had an experience when I was interviewing for a job that, where I had to, uh, uh, do a drug test
B.utt2: and, and it's, it was kind of a long story,
B.utt3: but it was, it was just an incredibly humiliating experience what I went through,
B.utt4: and it amounted to, uh, going in, uh, before any of these interviews,
B.utt5: I'm not even working for this company,
B.utt6: I'm going in for, like, interviews
B.utt7: and they flew me out to Chicago
Butt8: and, and, uh, before I went into any of the interviews, uh, they took me to the doctor to give me a physical.
B.utt9: They said it was going to be a physical, you know,
B.utt10: and, uh, actually beforehand they told me they were going to, uh, do drug screening,
B.utt11: but I had forgotten about that,
B.utt12: and so, basically, I'd already peed off ((in)) that morning
B.utt13: and, and when I got in there, I didn't, I wasn't, like, able to give a full sample,
B.utt14: and so –
A.utt1: Oh.
B.utt1: – they made me sit and wait for forty-five minutes, drink a whole ton of water –
A.utt1: Right.
B.utt1: – before <laughter> I went to any of the interviews and go in there again, -
B.utt2: and he, and the, the procedure is utterly humiliating.
B.utt3: You go in there with the doctor,
B.utt4: he makes you take off all your clothes
B.utt5: and then he examines you.

Figure 2: Specific Incident Story Example

B.utt2: she lives, -
B.utt3: it's a, it's a fairly large community.
B.utt4: She, uh, got real lucky, though.
B.utt5: She had a boss who, uh, moved into a larger office –
A.utt1: Uh-huh.
B.utt1: – and she's able to take her baby to work with her.
A.utt1: Oh, really?
B.utt1: And it's a small office that she works in –
A.utt1: Uh-huh.
B.utt1: – and, uh, it's a, it's a legal firm, office,
B.utt2: and it's just one lawyer –
A.utt1: Um.
B.utt1: – and so she's the only one really that takes care of the office.
B.utt2: There's no one else that works there.
A.utt1: Uh-huh.
B.utt1: And so they have an extra room and everything for the baby,
B.utt2: so it works out pretty good for her.

Figure 3: Habitual Incident Story Example

A.utt2: Now, I know that like Minyard's –
B.utt1: Uh-huh.
A.utt1: – and places like that around like Arlington and Fort Worth and a lot of those grocery stores, they have like four different bins out front.
B.utt1: Right.
A.utt1: Uh, different colors for different things and, and things like that,
A.utt2: but I, I do know some of these places were doing that
A.utt3: and they discontinued them because people were coming and dumping their trash in them.

Figure 4: Adapted Story Example

firsthand, support claim/statement, adapted truth value, irrelevant identity, emotionally irrelevant, and neutral testimony.

4.2.3. Orientation in Dialogue

The *orientation in dialogue* dimension focuses on the story's relation to the dialogue. It categorizes the source of the story and what function a story has within the larger context of the dialogue. The sub-dimension of source has categories to describe whether a story was experienced firsthand, relayed from a secondhand source, is a culturally common narrative that everyone is expected to know, or is from an official (institutional) source. Stories can also be described as having a vague source, if the speaker is not clear about the source. The distinction between firsthand and secondhand stories is dependent on the speaker's memory. If the speaker can include their own direct experiential observations in the story, it is firsthand. If it is told from the speaker's point of view but the memories and observations are secondhand, such as in the case of intoxication or young age obscuring the speaker's memory, the story is secondhand. Culturally common could include fairy tales, proverbs, or stories of well known events.

This story in Figure 5 is an example of a fairy tale. It is not from the Switchboard corpus, but rather an example drawn from a magazine article. Within at least European and some American culture, Grimms' fairy tales are well known stories to the general public. Although a listener may not know the story, if the speaker assumes it is known or could be known by the listeners, it is culturally common.

Other categorization of this story in Figure 5 would include third person, emotionally relevant, and invented (or possibly adapted) story. Many other annotations would depend on the context of this story in dialogue.

An example of culturally common well known story would be a story describing the general events that occurred on

Once upon a time there was a stubborn child who never did what his mother told him to do. The dear Lord, therefore, did not look kindly upon him, and let him become sick. No doctor could cure him and in a short time he lay on his deathbed. After he was lowered into his grave and covered over with earth, one of his little arms suddenly emerged and reached up into the air. They pushed it back down and covered the earth with fresh earth, but that did not help. The little arm kept popping out. So the child's mother had to go to the grave herself and smack the little arm with a switch. After she had done that, the arm withdrew, and then, for the first time, the child had peace beneath the earth.

Figure 5: Culturally Common Story Example

September 11, 2001. The official story would be one which followed the events reported by the federal government, perhaps as detailed in a press release, in contrast with a story reported through rumors or based on unsubstantiated theories.

The category of culturally common stories is likely to be domain specific, and can be determined primarily by context. Within a group of speakers, certain narratives may be assumed to be common knowledge. In general, if a speaker tells a story and clearly assumes aspects of the story are known to the listener, it is most likely a culturally common story.

The *function in dialogue* sub-dimension categorizes why a story has been told in dialogue. A story can directly answer a question, respond mirroring a previously told story with a related one, provide support or refute a claim made in the conversation, change the topic of dialogue, or continue or elaborate a previously begun story. This category is exclusively context dependent, coding for function of a story in the conversation's larger context. Any story can be assigned more than one conversational function if needed. For example, a story might both mirror a response of another speaker in the dialogue, and answer a question introduced in the dialogue. It might also not be clear why the story is being told, in which case the story is marked as *vague* for this function.

The story in Figure 6 is a brief example of a story that elaborates/continues a previous story/statement. Speaker A answers a question, but then tells a short story to expand her answer. This is also therefore an example of a story that could be coded with two functions: the story could be interpreted to be answering the question, as well. Other elaborating stories instead expand on a stated opinion, or go into further detail with a story begun earlier in dialogue.

This story in Figure 6's other annotations include singular, first person, firsthand, true, elaborate/continue story function, habitual specificity, emotionally irrelevant, and explicit/relevant identity. The relevant identity is *stay-at-home mother*.

The story in Figure 7 is another example that requires previous context. In this case, the context is a previous story,

Context
B.utt2: do you have kids?
A.utt1: I have three.
B.utt1: Oh, really?
A.utt1: Uh-huh.
B.utt1: <Laughter>.
A.utt1: Yeah,
A.utt2: I do <laughter>.
A.utt3: Yes, uh,
Elaborating Story
A.utt4: I don't work, though,
A.utt5: but I used to work and, when I had two children.
B.utt1: Uh-huh.
A.utt1: I work off and on just temporarily and usually find friends to babysit,
A.utt2: but I don't envy anybody who's in that <laughter> situation to find day care.

Figure 6: Elaborate Story Example

Context Story
A.utt3: I guess we're, we're just at the point, uh, -
A.utt4: my wife worked until we had a family
A.utt5: and then, you know, now we're just going on the one income
A.utt6: so it's –
B.utt1: Uh-huh.
A.utt1: – a lot more interesting trying to, uh, -
A.utt2: find some extra payroll deductions is probably the only way we will be able to, uh, do it.
A.utt3: You know, kind of enforce the savings.
Mirror Response
B.utt1: Well our situation is just a little bit, kind of the opposite of that cause my wife was not working for some time and was going to school and just recently, uh, took on a full time job, well almost full time.
A.utt1: Um.
B.utt1: So, it's only recently that we've had the money where we could start putting away large sums of it for, uh, long range goals like college and sickness and –
A.utt1: Um.
B.utt1: – travel and that kind of thing.

Figure 7: Mirror Response Story Example

which elicits a response of a similar story from the second speaker. This mirror story is the relevant example.

The other annotations of the story in Figure 7 include plural number, first person, firsthand, mixed specificity, true, mirror response function, emotionally irrelevant, story supports identity, and relevant identity. The relevant identity is

parent.

Question
B.utt1: I guess,
A.utt1: What kind of experience do you, + do you have, then with child care?
Answer Story
B.utt1: No,
B.utt2: I don't, I don't have any kids.
B.utt3: I, uh, my sister has a, she just had a baby,
B.utt4: he's about five months old
B.utt5: and she was worrying about going back to work and what she was going to do with him and –
A.utt1: Uh-huh.
B.utt1: – the different, -

Figure 8: Question Response Story Example

In Figure 8, the story is elicited by a question asked by the other speaker. This particular story is truncated, as it was interrupted in dialogue, but it exhibits the question response category of the function in dialogue dimension.
The other annotations of the story in Figure 8 include singular, third person, vague source, true, specific incident, elaborate/continue statement function, emotionally irrelevant, and irrelevant identity.

4.2.4. Identity

The *identity* dimension considers the relationship of the story to the constructed identity of the narrator. The identity of the speaker of a story may or may not be relevant to general understanding of the story, so the *explicit identity* sub-dimension categorizes stories based on whether the identity of the speaker is explicitly stated or relied upon in the story (e.g. whether speaker expertise is supported or informs aspects of the story). If identity is relevant, then the relevant identity should also be identified (e.g., military veteran, electrician, curmudgeon, etc.). The decision to annotate identity can be corpus specific, as in the case of the Distress Analysis Interview Corpus (Gratch et al., 2014), where some of the primary goals of collecting the corpus depended on the status of the interviewees with regard to mental health or military service. Alternatively, annotation of identity can be story specific, as in the Switchboard corpus annotations. Many stories could be told by a speaker of any identity, but some required identity specific context. These stories are annotated with the relevant identity as needed. In the case of story specific rather than domain specific identities, the other stories in the corpus would be annotated as unspecified/irrelevant identity.
The story in Figure 9 is a secondhand story that requires no specific identity of the speaker. Any speaker, human or virtual, could tell this story. It still may require some context, however: in this story, the speaker is located in San Diego. The truth of this story is also based on the timing of the events related. These elements, however, are largely outside the scope of the identity dimension.
This story in Figure 9's other annotations include mixed

A.utt2: In –
B.utt1: Yeah.
A.utt1: – fact, they're going to execute somebody at the end of this month.
B.utt1: Uh-huh.
A.utt1: And, uh, there's a big uproar going on right now. Uh –
B.utt1: Yeah.
A.utt1: – the, uh, Governor, you know, has been trying to decide whether he's going to commute it or not.
B.utt1: Uh-huh.
A.utt1: You know, it's someone who had, uh,
A.utt1: killed two teenage boys here in San Diego as a matter of fact.

Figure 9: Unspecified/Irrelevant Identity Story Example

number, mixed person, secondhand, true, specific incident, support a claim/statement, irrelevant identity, neutral testimony, and emotionally irrelevant.
The sub-dimension of identity testimony describes the relation of story to identity, with a story classified under one of three options. A story's described events or narrative can support a speaker's identity, a speaker's stated or proven identity can lend credence to the events described in a story, or a narrative can have neutral or mixed focus of identity.

4.2.5. Affect

The final dimension is *Affect*, a single dimension with no sub-categories. We code stories as either emotionally relevant, irrelevant, or vague. These respectively mean that the story has strong affect or appeals to the audiences' emotions, the story is emotionally neutral, or the story's emotional appeal is context-dependent or ambiguous. This dimension can be used in a manner appropriate to the context of the corpus, or alternately, the goals for the annotated stories.

5. Annotated Dialogue Data

We have so far used the annotation scheme described in the previous section to annotate sections of two different dialogue corpora, the Switchboard corpus (Godfrey and Holliman, 1993) and the Distress Analysis Interview Corpus (Gratch et al., 2014). In addition, we have analyzed short sections of other dialogue corpora, such as (Herrera et al., 2010) and the cartoon negotiations (Ziebart et al., 2012). In this section, we report on findings from the Switchboard annotations.

5.1. Annotation Tool

We examined several annotation tools, including Elan (Brugman and Russel, 2004) and the Story Workbench (Finlayson, 2008). We chose TAMSAnalyzer, (Weinstein, 2012) to annotate the data. This tool allows inclusion of markup tags in-text, and analysis of the tags run by the program. Tags can be multi-level, which allowed categories and sub-dimensions to be included.

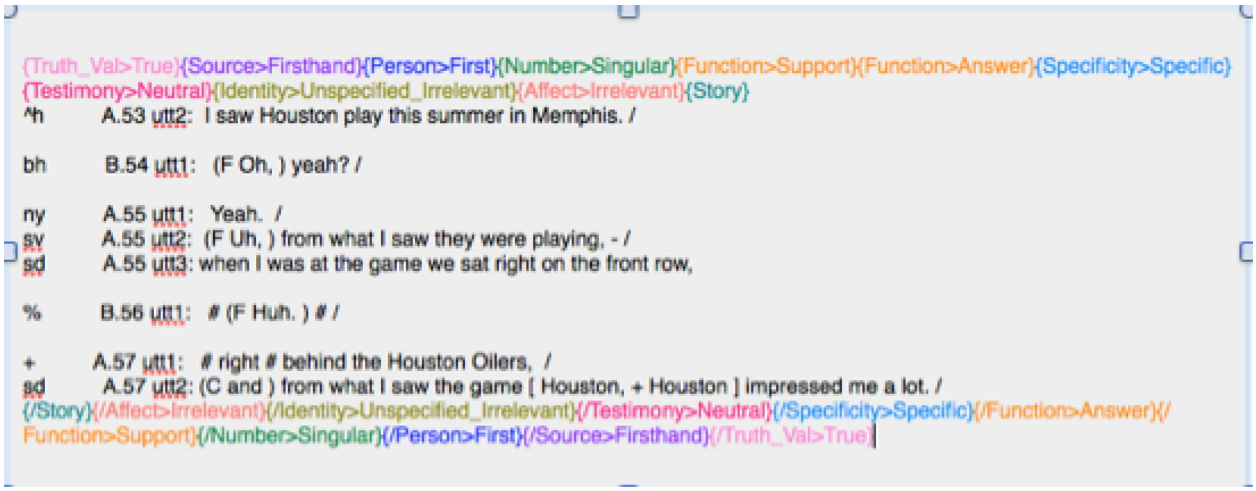

Figure 10: Annotated Switchboard Story

Figure 10 shows a short story annotated using the tool and annotations scheme.

5.2. Switchboard Annotations

In the Switchboard corpus, we fully annotated twenty dialogue transcripts based on this story taxonomy. In the annotated dialogues, we found 82 stories, with a mean of 4.1 stories in each dialogue, a median of 4, and a range of between 1 and 8 stories. The most common tags in each (sub)-dimension are shown in Table 1. This story in Figure 10 includes all of the most common descriptive tags.

dimension	most common tag	#
Number	Singular	40
Person	First	31
Specificity	Specific	57
Truth Value	True	50
Source	Firsthand	56
Function	Support	24
Identity	Unspecified/Irrelevant	59
I.Testimony	Neutral	66
Affect	Irrelevant	64

Table 1: Most frequent tags by dimension

Table 2 shows the relative frequencies of each tag for the person and function dimensions.

The patterns of person and source shown in Table 2 seems indicative of casual chat. One might expect more stories to refute claims for a debate or negotiation. Interestingly almost a quarter of stories are told in response to other stories, but other functions are also well represented. By contrast, in the Distress Analysis Interview Corpus, we noticed that virtually all stories are told as answers to questions, because of the one-sided interview nature of those dialogues.

6. Conclusions and Future Work

We have presented a taxonomy of stories told in dialogue. The taxonomy has a number of different dimensions and sub-dimensions, relating the story to different aspects of how and why it is told. We annotated a a portion of the switchboard corpus, and examined relative frequencies of these categories.

Tag	frequency
Person	
first	39%
second/generic	10%
third	25%
mixed	26%
Function	
Answer	23%
Elaborate	11%
Mirror Response	23%
Refute Response	4 %
Support	28%
Transition	11%

Table 2: Distribution of Person and Function tags

The annotations will serve several purposes in our future work. First, they can serve as test, and eventually training data for recognizing these aspects. We expect certain features like number, person, and function to be fairly easy to recognize, while other features may not be, however, perhaps there are lexical, syntactical and discourse cues that may be identifiable. Second, we intend to use this kind of distributional information to inform the story-telling ability of virtual characters in conversation, guiding the types of stories to tell in different circumstances, as well as serving as a bank of stories that a system could re-tell.

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