Slang4Pepper entered the chat

Building a slang-aware glossary for Social Robots interacting with Teenagers

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Abstract

Designing social robot interactions requires a deep understanding of the user's social and communication habits, as well as alignment with a shared communicative range to adapt to the cultural and linguistic norms of the target group. Adolescents represent a distinct cultural subgroup in all communities, characterised by a rapidly evolving, community-specific slang register, strongly shaped by internet-based, interest-driven discourse, often built around memes. Current robot dialogue systems are generally unequipped to handle this complexity.

This paper presents a strategy for constructing a structured glossary of neologisms and slang, using a mixed-methods approach that builds a target-specific corpus of teen-adapted vocabulary through a motivating case study: designing for Italian-speaking teenagers aged 11 to 15 in the context of Robot-Assisted Therapy for Autism. The proposed pipeline includes multi-source collection from diverse online platforms, layered corpus annotation combining expert-led labelling (for LLM training) with user-based validation (for usage and familiarity), and the development of a dedicated Android application *Slang4Pepper* to help adults translate youth slang and avoid obsolescence by updating the glossary with robot-mediated user input. The paper discusses the design rationale and methodological choices behind each phase, reflecting on their broader implications for the design of culturally aware dialogue systems for social robots targeting adolescent users.

Keywords

HRI, social robotics, Personalised interaction with agents, Natural language adaptation, Adaptive dialogue systems

1. Introduction

The need to personalise interactive systems to users' profiles is established across disciplines [1, 2, 3], critical in assistive robotics [4], and especially crucial for vulnerable groups, where cultural mismatches might compromise the effectiveness of support interventions [5, 6].

Recent Child-Robot work displays the importance of cultural norms for educational/therapeutic settings [7, 8]. When designing for Teens, a subculture defined by a vocabulary that serves as a primary marker of peer-group identity [9, 10], a Social Robot with an adult register is not only less appealing, but it also embodies the archetype our users avoid. In the context of Assistive Robotics for Autism, in which this paper is grounded [11, 12], most recent work demonstrates how neurotype mismatches (reflected in communication styles) drive social challenges [13], further stressing the importance of requiring culturally aligned robots, to tighten the social gap between autistic children and their allistic peers through the adoption of a shared vocabulary.

We propose a methodology for building a slang glossary, rooted in online platforms and validated directly by users, with the purpose of integration into various possible interaction designs to improve cultural and linguistic alignment with users. The paper is structured as follows: Section 2 reviews relevant literature findings that support our goals and decision; Section 3 formalises the communicative register mismatch and its technical challenges, which will be addressed by the case study **Slang4Pepper**, presented in Section 4 and aimed at building a replicable framework to obtain a sufficient glossary for the robot. Finally, the implications and limits are discussed in Section 5, and conclusion and future work are presented in Section 6.

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2. Background

Robot-assisted therapy for autistic children has been proven to produce better outcomes than traditional approaches. However, studies consistently show that robots lack sufficient communication skills, thereby limiting the effectiveness of interventions [14]. Recent studies highlight how these communication disruptions might be attributed to the robot's inability to understand children's slang [15]. This mismatch reduces the robot's effectiveness as a social mediator, overlooking the importance of adapting to the user's habits and social and cultural belonging.

As highlighted by Rintaningrum et al. [16], slang is an informal, temporary language form, usually used in restricted social circles to exclude outsiders from understanding the message. For teenagers, this means they can identify as no longer children and not yet adults by adopting a jargon that differs from the two groups [16, 9]. Specifically, this work is inspired by a prior study [15] that showed how the robot Pepper (deployed with autistic children aged 11–15) systematically failed to understand their peer-to-peer slang, causing a credibility gap that undermined its role as a social rehearsal tool. The work suggests that implementing slang capabilities in social robots will foster reliability, reframing the robot as a peer-like tool that mediates between children and adults while serving as a rehearsal partner for real-world social situations, facilitating skill transfer beyond therapeutic settings [2, 10].

It has been noted that teenage slang is derived from netspeak, the jargon of online communication [17], and evolves rapidly via social media, memes, gaming, and platform-specific discourse [18, 16]. As a community-dependent register across echo chambers [19], terms resist superficial definitions, their meanings shaped by tone, context, communicative function, and social circle [20]. This underscores the need for semantically comprehensive glossaries to enable robust dialogue generation, while maintaining precise, structured standards to support systematic updates [21].

3. Research Gaps and Design Goals

Main challenges identified by the literature described above are:

- **Semantic and pragmatic ambiguity.** Slang is highly context-sensitive and shifts in tone, intent, and function based on the interaction setting. Robots need a richer pragmatic annotation to infer whether a term is used humorously, affectionately, provocatively, or referentially [20, 22, 23].
- **Age-appropriateness filtering**. Relying on online spaces as a source exposes the system to a lexicon that might not be suitable for users under 15, especially in a therapeutic context. A selection process is necessary to exclude explicit, discriminatory, or otherwise inappropriate material while preserving the corpus's authenticity [24].
- **Lack of structured lexical resources for Italian slang.** Compared with English, Italian adolescent slang is still poorly represented in structured, machine-readable resources. Existing web glossaries offer useful starting points, but they typically provide definitions and examples without the layered semantic and pragmatic information needed for dialogue generation or future knowledge-graph construction [21].

To face the challenges we defined the following defined Design Goals:

- **DG1 – Linguistically Grounded Representation**: Each term should be annotated with the linguistic and pragmatic information needed to capture differences in usage across communities, including usage domain, communicative function, and affective tone.
- **DG2 – Community-aware coverage**: the corpus should cover the main communicative communities relevant to teenagers, including everyday language and context/hobby-specific terminology, to better reflect usage patterns.
- **DG3 – Age appropriate content**: The resulting glossary must be curated to exclude expressions that are inappropriate in therapeutic settings, following explicit inclusion and exclusion criteria.
- **DG4 – Extensibility of the resource**: The resulting glossary should be continuously updatable and expandable to track the rapid evolution of netspeak and youth jargon.

4. Slang4Pepper

As suggested by the chapter title, our case study presents the development of a slang-aware glossary for implementation in Softbank's robot Pepper, combining corpus construction, semantic annotation, user validation, and a lightweight maintenance mechanism.

4.1. Methodology

1) Multi-source Collection: 214 netspeak terms were gathered via *Social Scrolling* [18] from Instagram, TikTok and YouTube, as emerged as primary sources in the longitudinal study that inspired this work[15]. Each term was then confirmed to be in use and defined by manually checking its definition in the netspeak via specialised online databases[1]. A few ambiguous terms required disambiguation by context, echo chamber, and tone, yielding 231 validated definitions, then filtered for age appropriateness (≤15 years, no explicit/violent/discriminatory content), resulting in a corpus of 198 terms.

2) Layered Annotation: After filtering the corpus out age for age appropriateness (≤15 years, no explicit/violent/discriminatory content), two more layers of annotation were deemed necessary:

a. **usage spread**, or target group familiarity: teenagers labelled each term as "don't know", "know, but don't use", or "know and use".
b. **semantic labelling**, anticipating dialogue design strategies (including LLM integration) included: *Standard Form* (is-a relations), *Semantic Cathegory* (WordNet[25]), *Usage Domain* (daily, gaming, movies, etc.)[26], *Communicative Function* (phatic, referential, expressive, appellative)[27, 20], *Tone* as polarity (positive/negative/neutral) and specific (affectionate, sarcastic, etc.)[22, 23]

The corpus was then provided through Google Forms to an annotator pool of 35 teenagers[2], aged 11-15, with the sample skewed toward older participants (with a median age of 14).
Usage spread labelling revealed that the glossary terms were generally familiar and highly active, as 71,6% of the terms were recognised, and 43,8% of those were reported as "know and use", leaving a small gap of 27,8% of terms known but not in use.
As expected from these results, the **semantic labelling** confirmed a clear preference for using slang terminology with pragmatic functions (expressive: 51,5%, referential: 39,4%, phatic: 6,1%, appelative: 3,0%), indicating a use to convey attitudes, emotions, and interactional stance rather than simply referencing popular content. Finally, it also described the collected vocabulary as successfully covering the diverse usage contexts and echo chambers of teenagers, with 43% of the terminology applicable in everyday life, while the remaining 57% is heterogeneously distributed across popular interests such as gaming, movies, and social media discourse.

4.2. Maintenance

Our proposal addresses slang obsolescence by developing *Slang4Pepper*, an Android application for Softbank's Pepper that serves as a multimedia dictionary. The app supports guided voice and tablet-based navigation, allowing teenagers to browse slang terms by topic, inspect meanings and examples, and submit new entries for later review and integration into the corpus. These suggestions are collected to be checked for age appropriateness and semantic consistency before being considered for inclusion. This iterative design helps the glossary keep pace with the rapid evolution of newer-generation slang.

[1]Definitions were checked on KnowYourMeme https://knowyourmeme.com/, Slengo https://slengo.it/, and UrbanDictionary https://www.urbandictionary.com/.
[2]Ethical approval for this study was obtained from the bioethical committee of the University of Turin, with approval number 0332723

5. Discussion

While our mixed-methods pipeline successfully established a robust initial corpus, several limitations warrant consideration for future implementations:

Terms Inappropriateness handling: Currently, inappropriate terms (explicit, violent, discriminatory content) are filtered out during validation. However, as evidenced in [15], a robot with limited vocabulary, such as the inability to comprehend inappropriate slang, can make an easy target for mockery, potentially undermining children's trust and, consequently, therapeutic success. Future implementation should consider integrating those, pairing them with safe *deflection strategies*.

Crowdsourced Suggestion Validation: The *Slang4Pepper* App enables user contributions that pose challenges: suggestions may reflect hyper-local *inner-circle* slang or malicious neologisms designed to mock. Cross-validation against multiple sources (social media trend analysis, peer usage frequency) and minimum usage thresholds are needed before glossary integration.

Semantic Labelling Scalability: Specialised slang databases prevent bulk access, prohibiting scraping, and, with no API support, programmatic, high-volume netspeak lookups need to be handmade, forcing labour-intensive single-term consultations that severely limit scalability and maintenance.

Corpus Collection Frequency: Periodic *Social Scrolling* [18] on teen-preferred platforms is essential for maintenance but is again limited by the target platforms, preventing automated harvesting. Unlike Reddit or X/Twitter (which maintain developer APIs but see limited Italian teen usage), Instagram, YouTube, and TikTok prioritise individual content discovery over bulk data collection, making continuous monitoring resource-intensive.

6. Conclusion and Future Work

This paper presents a comprehensive framework that bridges the linguistic gap between social robots and teenagers (ages 11–15). Through a three-phase pipeline, we established an age-appropriate slang corpus of 198 validated terms that are familiar to and used by teens. The work successfully achieves all four design goals, establishing a robust, extensible slang glossary for social robots, in particular:

- DG1 Terms are richly annotated with pragmatic features (Jakobson functions[27], WordNet categories, BabelNet domains, multi-level tones), enabling nuanced dialogue generation.
- DG2 The corpus is confirmed by the user's annotation to contain known and used vocabulary that spans key echo-chambers (daily 43%, gaming/social 35%, anime/movies 22%), reflecting authentic usage diversity.
- DG3 Rigorous filtering excluded all explicit/violent/discriminatory content, yielding a 100% safe corpus for 11–15 year-olds.
- DG4 Slang4Pepper's crowdsourced pipeline ensures continuous updates, addressing the obsolescence of netspeak through teen-validated contributions. Future work includes LLM-assisted annotation for scalability, automated trend monitoring, robust *troll*-detection for suggestions, and longitudinal trials measuring therapeutic impact.

Future work will focus on organising knowledge into a scalable and semantic structure that facilitates the use of vocabulary in dialogue activities. Additionally, we will implement strategies to address inappropriate content, ensuring that the robot can understand and respond appropriately to such remarks. We will also collaborate directly with children to develop more sustainable methods for gathering terms and definitions, including those that are not derived from internet slang.

Declaration on Generative AI

The author employed Grammarly exclusively for orthographic and grammatical proofreading of the final manuscript draft. No content generation, ideation, or substantive revisions were AI-assisted.

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