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**AIUCD 2021**

**DH per la società:** e-guaglianza, partecipazione, diritti e valori nell'era digitale

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DIGITAL PUBLIC HUMANITIES  
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# Language Disparity in the Interaction with Chatbots for the Administrative Domain

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## ABSTRACT

The high impact of the Internet on citizens' daily life and the widespread use of mobile devices has led the Italian Public Administrations to communicate through the Web and digital media. Chatbots are one of the most recent technologies adopted by public institutions. This work focuses on the interaction of citizens with a chatbot able to answer questions about the administrative domain. In particular, the main objective is to identify the relevant variables involved in the reading comprehension process of texts written in the Italian administrative language. A key element of this research is represented by the target population (i.e., Italian second-language learners, elderly Italians, and Italians with a low-literacy level) to ease the access to administrative texts by people with a lack of reading skills.

## KEY WORDS

chatbot, language disparity, second-language learners, low-literacy, elderly, public administration

## 1. INTRODUCTION

The complexity of the Italian administrative language is well-known. The writing style adopted in administrative texts is often artificial and obscure [1], to the point of misleading the readers [2]. The Italian community shows several language disparities: Its members in fact have different levels of language proficiency [3]. Since the early Nineties, Italian institutions have encouraged Public Administrations (PAs) to adopt plain language in writing official acts and communications [4], in order to fulfill constitutional obligations concerning substantive equality of citizens [5]. Witnessing the broad access to the Internet and the extensive use of mobile devices by citizens, PAs have been increasingly choosing to communicate through innovative digital technologies, like chatbots. Chatbots, or chatterbots, are artificial conversational agents that interact with humans and answer their questions using natural language dialogues, thanks to Artificial Intelligence (AI) (mostly neural) techniques [6]. In the interaction between PA chatbots and citizens, language disparity could impede full access to administrative texts. The main goal of this work is to detect which factors affect the comprehension process of citizens with a lack of reading skills when reading administrative texts, in the interaction with AI systems. The long-term aim of this study is to increase the legibility of these texts and facilitate access information related to the administrative domain.

## 2. METHODOLOGY

According to [5], text comprehension can be seen as the result of the interaction among a subject with his own socio-cultural and sociolinguistic identity, the communication context, and the key element of the communicative event, i.e., the text. Text simplification based on complexity linguistic features can improve the legibility of texts. However, it may not be sufficient to guarantee text legibility in the AI-human interaction on digital devices, especially if the readers are not fully proficient in the Italian language. Reading comprehension tests represent an essential tool to assess legibility when designed to observe and measure all the variables affecting text comprehension. In fact, text complexity can be defined as a function of the linguistic features of a text (i.e., the administrative language), the variables related to specific targets (i.e., members of a community with language disparities), and the reading context, which includes the purpose of reading and the medium used (i.e., new digital technologies).

Our experiment goal is to assess the effectiveness of text simplification based on linguistic traits within this context. To this purpose, informants will be asked to read administrative texts in their original or simplified versions. Such texts consist of administrative acts and city halls' web pages content. Text simplification is evaluated through readability assessment tools based on Natural Language Processing (NLP) techniques [7]. The result of this process is a parallel corpus, where administrative texts are split into sentences and coupled with their simplified version. Readers will be also

asked to answer a small set of questions related to each text. The readability level of test and items rubrics will be assessed using NLP tools as well.

## 2.1. Italian Administrative Language

The Italian administrative language is defined by [5] as a sectorial variety of Italian, along with other language varieties *for special purposes*. A fundamental step for the simplification of administrative texts is to detect the linguistic features of the administrative language. The use of *pseudo-technicisms* (e.g., “balneazione”, “fattispecie”) and formal terms (e.g., “ovvero”, “allorché”, “suddetto”), the predominance of hypotaxis over parataxis, and a writing style focused on the writer rather than on the reader can be considered among such linguistic traits [7]. Finally, it is necessary to distinguish the features that can be automatically extracted with computational linguistics techniques from those that can be detected only by human experts.

## 2.2. Language Disparity

We selected four groups of informants: Italian second-language learners, elderly Italians, Italians with a low-literacy level, and a control group of Italians with medium-high-literacy level. For what concerns the first group, supporting the access in reading administrative texts could be especially useful for learners with A2 proficiency level<sup>1</sup> [8]. The A2 level is a basic requirement to obtain a long stay permit in Italy [9], whereas B1 learners are already independent in second language communication [10]. Italian low-literacy readers are those subjects who did not obtain a high school certificate. Among them, there are also *functional illiterates*, who have lost or never developed the ability to write or read a text about ordinary events or problems of social interest [3]. Finally, we consider an elderly a person who is at least 65 years old. In 2019, 72.66% of elderly people in Italy had early secondary school education at most<sup>2</sup>. Besides the decline in cognitive resources [11], elderly’s reading skills are influenced by the reader’s previous knowledge and even more by their reading habits [12].

## 2.3. New Technologies

Since the test will be taken remotely on mobile devices, variables concerning the text physical support will be considered as well. Digital media affect the reading comprehension process, especially in relation to the text length, the readers’ age, and electronic device features, such as the screen brightness [13]. Finally, we want to examine how readers’ comprehension is affected while reading administrative texts returned by a chatbot based on AI. Interfaces design has become a central issue in Digital Humanities. Design choices affect Human-Computer Interaction since they can enhance or damage any digital experience [14]. To improve the usability of digital tools, designers decided to build them adopting metaphors from real life: Macintosh organized the screen as a desktop, whereas Facebook based its usage on the concept of friendship [15]. Chatbots ease access to information by imitating the users’ interaction with real operators, although such technology still shows some limitations. According to recent studies users are rather reluctant to interact with conversational agents, which are not able to establish a satisfactory relation since they lack the sensibility of human operators [16]. The first chatbot, ELIZA, was created to simulate a dialogue with a Rogerian Psychologist. It was implemented in 1966 and based on a pattern-matching rule-based system [17]. Nowadays, chatbots are defined as non-task-oriented dialogue systems, usually implemented adopting either generative methods or retrieval-based techniques [18]. The formers are usually based on AI techniques: neural networks are fed with dialogue data and return answers generated through statistical computations. In the letters, retrieval-based techniques match the user’s message with the correct stored answer. State-of-art systems adopt neural architectures to label the correct answer to each message [18].

## 3. EXPECTED RESULTS AND FUTURE WORK

The results obtained from this reading comprehension test can be used to make predictions on the actual level of informants’ comprehension, by applying a generalization process [19]. If readers find the simplified texts still hard to read, this test will be a useful tool to detect features affecting their comprehension process, other than complexity linguistic traits.

Future work will also include the design of suitable simplification strategies which will involve specific features related to each group of readers, the medium used, and, more in general, the examined communication context. Neural

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<sup>1</sup> According to CEFR (Common European Framework of Reference for Languages).

<sup>2</sup> Source: Istat (Italian Institute of Statistics).

architectures already employed in machine-translation tasks [20] and models exploiting contextual word embeddings [21] will be evaluated for this purpose.

An interesting development of this work could consider a shifting along the diamesic axis. People with visual impairments, like some elderly people, may prefer to ask for such information vocally. For this reason, comprehension texts based on speech recognition tasks could ensure the access to this part of the population too.

#### 4. CONCLUSION

PAs employ new digital technologies for communicating with citizens, in order to reach a higher number of users. This research aims at identifying the variables involved in the comprehension of administrative texts by people not fully proficient in the Italian language using digital media, to enhance their digital and democratic inclusion within the Italian citizenry.

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