CROWDSOURCING FOR HISPANIC LINGUISTICS: AMAZON'S MECHANICAL TURK AS A SOURCE OF SPANISH DATA[*]

Iván Ortega-Santos
University of Memphis

ABSTRACT. Within the field of Linguistics, Amazon's Mechanical Turk, a crowdsourcing marketplace specializing in computer-based Human Intelligence Tasks, has been praised as a cost efficient source of data for English and other major languages. Spanish is a good candidate due to its presence within the US and beyond. Still, detailed information concerning the linguistic and demographic profile of Spanish-speaking 'Turkers' is missing, thus making it difficult for researchers to evaluate whether the Mechanical Turk provides the right environment for their tasks. This paper addresses this gap in our knowledge by developing the first detailed study of the presence of Spanish-speaking workers, focusing on factors relevant for research planning, namely, (socio)linguistically relevant variables and information concerning work habits. The results show that this platform provides access to a fairly active participant pool of both L1 and L2 Spanish speakers as well as bilinguals. A brief introduction to how Amazon's Mechanical Turk works and an overview of Hispanic Linguistics projects that have so far used the Mechanical Turk successfully is included.

Keywords. Amazon's Mechanical Turk; crowdsourcing; Spanish Linguistics; data collection; research planning.

RESUMEN. Dentro del campo de la lingüística, el *Mechanical Turk* de Amazon, una plataforma de *crowdsourcing* especializada en tareas de inteligencia humana (human intelligence tasks) desarrolladas en la computadora, ha sido alabado por permitir la recogida de datos del inglés y otras lenguas de forma económica. Esta herramienta resulta prometedora para el español por la presencia de esta lengua en EEUU y a nivel global. Sin embargo, los/as investigadores/as no disponen de información detallada sobre el perfil lingüístico y demográfico de los hablantes de español inscritos en esta plataforma. Esto dificulta que puedan evaluar si el *Mechanical Turk* es apropiado para sus proyectos. La presente investigación busca remediar esta situación por medio del primer estudio detallado de la presencia de trabajadores hispanohablantes, con particular énfasis en factores relevantes para la planificación de investigaciones, en concreto, variables (socio)lingüísticas y hábitos de trabajo. Los resultados muestran que esta plataforma da acceso a un número sustancial de hablantes de español como primera y segunda lengua, así como bilingües. Este estudio se complementa con una introducción al funcionamiento del *Mechanical Turk* y un resumen de proyectos que ya ha usado este servicio para estudios de lingüística hispánica.

Palabras clave. Mechanical Turk de Amazon; crowdsourcing; lingüística hispánica; recogida de datos; planificación de la investigación.

1. Introduction

Amazon's Mechanical Turk (referred to as MTurk or AMT in the literature; the former label is used henceforth) is a marketplace that specializes in computer-based Human Intelligence Tasks (HITs) allowing employers to outsource their tasks by hiring a 'crowd' online (crowdsourcing). This service is increasingly being used for behavioral research due to the cost-efficient access to a participant pool it provides. Within the field of linguistics, the relevance of MTurk and crowdsourcing, as well as its potential impact, has been emphasized by various researchers. For instance, Munro and Tily (2011: 7) summarize the advantages of crowdsourcing in the following terms:

> 'with any researcher now able to run experiments quickly and cheaply, anybody can be a principal investigator. The lowered barrier has also resulted in novel empirical research from fields like formal semantics and theoretical syntax: subfields with very little prior experimental research (…).'

In turn, Gibson and Fedorenko (2013) follow this line of thought by claiming that this marketplace can help syntax and semantics adopt strong(er) quantitative/methodological standards, as researchers may run cost-efficient experiments incorporating a high number of participants, in contrast to the standard data gathering techniques that are frequently used in these subfields (see Sprouse, Schütze and Almeida 2013 for relevant discussion; see Gibson, Piantadosi and Fedorenko 2011 for instructions for how to use their 'freely available software in order to (a.) post linguistic acceptability surveys to Mechanical Turk; and (b) extract and analyze the resulting data' (Gibson et al. 2011: 519). Thus, the use of crowdsourcing for linguist research reveals an emerging trend in the field, namely, the interest in going beyond traditional data gathering techniques to incorporate new tools, e.g., not only crowdsourcing, but also big data or citizen science.[1] Nonetheless, the exact extent to which MTurk is useful for a global language like Spanish remains to be established, given the anglo-centric nature of this marketplace. For research planning purposes, it is crucial to have access to (socio)-linguistically-relevant information regarding the profile of the Spanish-speaking workers, a.k.a. Turkers, as well as their work habits (e.g., type of tasks they do or number of hours they work on MTurk per week). Why? In the absence of such detailed information, researchers working on Hispanic Linguistics are forced to take a leap of faith concerning the usefulness of this tool. Thus, the issue is real. Additionally, a relatively small number of Hispanic Linguistics projects have already been developed using this marketplace; researchers would also benefit from learning which projects have been successful so far, a task also undertaken here. The resulting picture provides an overview of the pros and cons of the use of this tool for research in Hispanic Linguistics. A brief introduction to MTurk is included as well. Thus, the present research, meant as resource for the field, is unique in its focus, Hispanic Linguistics, and in the level of detail concerning factors relevant for research planning. While the relevance of this research is not limited to Theoretical syntax, as noted by Munro and Tily (2011) and Gibson and Fedorenko (2013), that discipline can benefit significantly from the use of MTurk.

This paper is organized as follows: Section 2 presents some basic background on MTurk focusing on how it works and on data quality, section 3 summarizes previous

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[1] Crowdsourcing may also involve volunteers, e.g., the Smithsonian's Transcription Center (https://transcription.si.edu/) relies partially on digital volunteers. See also the Microcontact interactive Atlas for Italo-Romance heritage data (https://microcontact.hum.uu.nl/), directed by Roberta D'Alessandro.

research on the demographics of MTurk, section 4 details the methodology of the present study and section 5 presents the results, followed by a discussion in section 6, including an overview of previous Hispanic Linguistics projects that have used MTurk. The paper ends with a future research section (section 7) and conclusion (section 8).

2. Background: How MTurk Works

Here, I focus on some practical information concerning the use of MTurk, the way the researcher can have control over the participant pool (section 2.1) and data quality (section 2.2.). Readers interested in a detailed introduction to crowdsourcing for language-related research, including a list of alternatives to MTurk, are referred to Jones (2012).

Prospective employers or requesters can log in to MTurk at http://mturk.com using a regular Amazon.com ID and password (or just create a new account). The marketplace offers templates for various tasks (HITs) ranging from surveys to writing tasks or the moderation of images; tasks may be posted on an external site, in which case workers would access the HIT information on MTurk and receive their payment through the platform as well. Payments start as low as US$0.01 (for microtasks) and MTurk charges 20% of the payment (in 2019). According to Ipeirotis (2010) the estimated hourly wage was approximately $5 at the time he was writing and, consequently, ethical concerns have been raised within the scientific community (see Fort, Adda and Cohen 2011) and beyond. The requester determines the payment, the time allotted per assignment, the expiration date and, to a certain degree, the profile of the workers, in which case additional fees may apply (see section 2.1. for details). Furthermore, the requester decides whether to approve or reject the work with no payment being issued in the latter case. Turkers choose freely which HITs to complete and remain anonymous on the platform as they are only identified through work IDs, a non-trivial aspect for research with human subjects.

It is worth noting that one relevant restriction may affect researchers working on Spanish, namely, the fact that, as of February 2019, only employers from certain countries may use MTurk to get tasks completed: while European countries qualify (including Spain and Portugal), Latin American countries are excluded for the most part (only the following qualify in the Americas: Barbados, Canada, Chile, French Guiana, Guadeloupe, Martinique, Puerto Rico, US, US Minor Islands and US Virgin Islands). Again, this is a restriction on the location of job-givers (requesters), not on the workers, who may come from any country in the Americas and beyond, as seen in the results of this research.

2.1   Control over the subject pool

Linguistic skills, while included among the workers' qualifications that requesters may choose subject to an additional charge, do not provide the level of detail needed for linguistic research. Specifically, requesters may choose the qualification 'Language Fluency (Basic) – Spanish' (or Chinese Mandarin, French, and German).[2] The present research is meant to ease this issue, but it does not include information concerning the profile of individual workers, as no personally identifiable information was gathered following standard research practices. Therefore, I list very briefly various alternatives to have control over the subject pool in MTurk (and in other environments), with an

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[2] Additional restrictions (or worker qualifications) available that might be relevant for linguistic research are: percentage of previously approved HITs of the workers (so as to verify the quality of their previous work), age, gender, educational background (US) and income (relevant for sociolinguistic research).

emphasis on those factors that are most relevant for linguistic research, particularly for the study of world languages. The following strategies stand out: Using IP restrictions, an option available on MTurk without any additional charge, is particularly relevant whenever there is a specific area or language of interest. Specifically, the marketplace includes the option of restricting the IP address to each Spanish-speaking country and to US states and territories, including Puerto Rico, a non-trivial feature for dialectal research in the Hispanic world.[3] For instance, for quality control purposes, Pavlick et al. (2014) suggest geolocating the users to verify whether they reside in countries where the language under study is likely to be spoken (survey tools such as Qualtrics may record the IP and geolocation services are available for free on the web, for instance, see https://www.iplocation.net/). Making the linguistic input of the experiment available as images (Zaidan and Callison-Bruch 2011) or audio, can also prevent workers from using automatic translation tools included, for instance, in their browsers. Administering a background questionnaire and/or a language placement test as part of the experiment to determine the language skills of the participants is still another standard research practice in this context. In turn, Huff and Tingley (2015: 6) suggest building "pools" of prior MTurk respondents by 'having a MTurk respondent take a survey where the researcher records variables of interest, such as age, race, gender (…) and then match these characteristics to the unique identification number possessed by every MTurk respondent.' Once this pool is developed, researchers can recontact their prior respondents to recruit the Turkers who have the right profile for the research project. For linguistic research, this option would also be useful if a follow-up study with the same participants is needed or if the researcher needs to avoid certain participants, e.g., to avoid nonnaïveté resulting from their participation in previous experiments (see Chandler, Mueller and Paolacci 2014 for relevant discussion). Finally, for linguistic research on Spanish and other languages, posting the instructions in the target language is important (Fuchs et al. 2015) as this would add another layer of security to rule out impostors.

2.2   Data quality and validation studies in the language sciences

With regard to data quality, beyond geolocating workers or using images for (written) test sentences (see previous section), it has been suggested that data quality may improve through the use of, at least, the following strategies: for instance, by checking for attentiveness through the use of screeners or by embedding gold standard controls, [4] checking for response time outliers or, when pertinent, hiring multiple workers to do the same task and comparing the convergence rate among the responses (see Berinsky, Margolis and Sances 2014; Jones 2012; Munro, Bethard, Kuperman, Lai, Melnick, Potts, Schnoebelen and Tily 2010; Pavlick et al. 2014, a.o., for detailed discussion).

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[3] The researcher should take into account that workers may avoid this kind of control, for instance, through IP spoofing (IP forgery) or VPN usage (a Virtual Private Network that can be used to access region-restricted websites). Still, the said IP restrictions would help reduce the number of impostors.

[4] In the words of Berinsky et al. (2014: 739) 'screeners work by instructing subjects to demonstrate that they are paying attention by following a precise set of instructions when choosing a survey response option.' In turn, gold standard controls or honey pots are questions, tasks, etc., with known answers. As stated by Jones (2012: 7), 'the worker completes these as part of their work, but unbeknownst to them, the requester knows the answer to the honey pot questions and can easily check for faked or poor quality work.' It is worth noting that there have been some concerns about the 'overzeleaus' exclusion of participants to improve data quality, e.g., when checking for unattentiveness (Chandler et al. 2014, a.o.; see Berinsky et al. 2014 for potential solutions to the criticisms concerning the uses of screeners).

A separate line of inquiry has sought to validate the use of crowdsourcing for language-related research: e.g., Sprouse (2011:155) validated the marketplace for the collection of acceptability judgments in syntactic theory through a 'quantitative comparison of two identical' English-language experiments, 'one conducted in the laboratory and one conducted on MTurk' (Sprouse 2011: . In turn, Nagle (2019) focused on L2 speech ratings in Spanish and found these to be reliable for comprehensibility and fluency and less so for accentedness. Outside the field of linguistic theory, the Natural Language Processing literature has researched the validity of MTurk most prolifically. It is beyond the scope of this paper to provide an overview of the latter literature, but it has focused on translation tasks and the creation of multilingual corpora, among other topics. For instance, Irvine and Klementiev (2010) looked at the quality of annotations for natural language tasks across languages and found that Spanish (and Polish) showed the highest amount of agreement with the controls; see also Snow, O'Connor, Jurafsky and Ng 2008 for a validation of annotations for natural language tasks for a diverse set of examples of linguistics research. In turn, the use of MTurk for translation has also merited some attention: Crucially for present purposes, Pavlick et al. (2014) noted that the Spanish language stands out for the speed quality of work completion.[5] While relevant, it should be noted that Pavlick and colleagues base their conclusion on research using word translation tasks, which can only provide a limited insight when compared to the necessities of other projects in the field of linguistics. Other language-related validation studies focus on relevance evaluation ratings (Alonso and Mizzaro 2009) or the transcription and annotation of spontaneous meeting speech (Marge, Banerjee and Rudnicky 2010). Fields other than the language sciences have done similar validation work, e.g., political sciences (see Berinsky et al. 2012).

3. Previous research on Spanish-speaking Turkers

The absence of (socio-)linguistically relevant information about the workers hinders the research planning process. The demographics of the Turkers, are receiving attention, precisely because they may determine whether this marketplace is appropriate for a specific research project (e.g., see Levay, Freese and Druckman 2016; Huff and Tingley 2015 and Ross, Zaldivar, Irani and Tomlinson 2010). Unfortunately, little information on Spanish-speaking workers is available. This being said, the existing studies already contain same information worth reviewing: First, previous research has emphasized that the typical Turker is highly educated, urban, young and female and has a low average income. At first sight, this might seem to be a highly specific demographic segment, which may not be appropriate for every single kind of project. Nonetheless, Berinsky et al. (2012: 352) notes that 'the demographic characteristics of US MTurk users are more representative and diverse than the corresponding student and convenience samples typically used in experimental political science studies.' Second, non-White groups are under-represented in the US (see Berinsky et al. 2012; Huff and Tingley 2015; Levay, Freese and Druckman, 2016, a.o.), a fact that could in principle affect the ability to recruit Spanish speakers. This being said, Huff and Tingley's (2015: 7) study of US-based Turkers concludes that 'MTurk is relatively strong at attracting young Hispanic females'. While these demographic studies are relevant in the present context, the label *Hispanic* refers to the cultural heritage of an individual or group of individuals. The linguistic profile of those workers

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[5] In turn, see Irvine and Klementiev (2010) for discussion on the use of MTurk for projects involving less commonly used languages.

is, therefore, missing and it may include English-Spanish bilinguals, heritage speakers or either English or Spanish monolinguals of Hispanic descent.

Research with Spanish-speaking participants provides still another limited insight into the topic in contrast to demographic studies without information on linguistic profile of the Hispanic population. Table 1 includes a selection of works that are relevant in this light.

Table 1. Non-exhaustive list of works using Spanish-speaking Turkers. Hispanic Linguistics projects are marked with an asterisk

Authors	Subjects	Topic of research	Location
Turner et al. (2012)	163	health materials evaluation	US
Pavlick et al. (2014)	131	world languages in MTurk	world-wide
Fuchs et al. (2015)*	126	agreement in Spanish	US
Guajardo (2017)*	38 + 38	Spanish subjunctive	Mexico and Spain
Parafita Couto and Stadthagen (2017)*	34	code-switching study	US
Stadthagen et al. (2018)*	82	code-switching study	US
Stadthagen et al. (2019)*	80	code-switching study	US
Nagle (2019)*	54	L2 speech ratings	world-wide

The Spanish-speaking participants in Pavlick et al.'s study came from the following countries: 122 from the US, 16 from Mexico and 14 from Spain. Guajardo's participants came from Mexico (38) and Spain (38). In the case of Stadthagen et al. (2019) the 80 participants were English-Spanish bilinguals. Finally, Nagle (2019) recruited 54 native speakers of Spanish; 22 from Venezuela, 10 from Mexico, 8 from Colombia and 5 from Spain.

The presence of Spanish-speaking workers on MTurk has also played a role in discussions regarding participant payment, where higher payments are needed to attract speakers of less commonly used languages. For instance, Ambati et al. (2010: 4) state the following: 'When working with a language pair like Spanish-English pricing is not an issue due to the availability of Spanish speakers, but we imagine pricing to play a major role as we start exploring other language pairs where not many speakers of the language can be found on the web.' In turn, Ambati and Vogel's (2010: 62-63) research calibrated the costs of work involving various language pairs (e.g., Spanish-English, Urdu-English, etc.) and found Spanish-English to be the cheapest language pair, starting at $0.01 (for micro-tasks, obviously).[6]

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[6] While Ambati and Vogel (2010) and Ambati et al. (2010) focus on the creation of parallel corpora for machine translation -with tasks ranging from the translation of full sentences to the translation of phrases-, their research includes relevant information on the use of Spanish by workers and, thus, is relevant for the present research.

4. Methodology

The study was carried out in accordance with the recommendations of the Institutional Review Board at the University of Memphis. The protocol was approved by this board. All subjects gave written informed consent in accordance with the Declaration of Helsinki. The instructions and the information concerning the HIT were all posted in Spanish on MTurk to attract Spanish-speaking respondents while filtering non-Spanish speakers (see section 2.1). No IP/location restriction was imposed due to the world-wide presence of L1/L2 Spanish. Similarly, following Ross et al. (2010), workers were not required a specific percentage of previous approval rate. As the use of MTurk is not as wide-spread in Hispanic countries as in the US, this was deemed necessary to be able to reach more potential respondents. A link allowed workers to take the survey on Qualtrics. Participants received a validation code at the end to enter it into MTurk as a way of certifying that they completed the HIT. The payment was US $0.20.[7]

Initially, the present survey was made available for 7 days (see also Ross et al. 2010) in July 2017 and 202 Turkers responded. After that, the availability of the HIT was extended for still another 7 days and the final participant number was 269. The questions were designed to help researchers better understand the pros and cons of using MTurk as a participant pool for a variety of Hispanic Linguistics projects. Thus, questions range from background information (e.g., age, gender, education, national origin and indexes of socioeconomic status) and linguistic profile to MTurk work habits (e.g., types of work completed on MTurk and frequency of use). General background questions and inquiries about work habits were translated and/or adapted from the literature on MTurk demographics, particularly, Ross et al. (2010) and Huff and Tingley (2015). The questions on language knowledge were created for the survey.

To avoid alienating L2 speakers with low proficiency (who could preview the survey and decide whether to accept the HIT or not) and to avoid confusing native speakers of various dialects/countries, paraphrases and example definitions were used at various points in the survey, e.g., in the case of the occupation or the definition of 'native speaker':

(1)   a.   Ocupación o trabajo
           Employment or work
      b.   Soy hablante nativo de dos o más lenguas (por ejemplo, aprendí
           español en la familia y otra lengua fuera de la casa o aprendí dos
           lenguas dentro de la familia)
           I am a native speaker of two or more languages (for instance, I learnt
           Spanish at home and another language outside or two languages at
           home)

While no language test was used to assess the self-reported linguistic knowledge of the respondents, the survey included various benchmarks, namely, answers in which the respondents were asked to type the responses to verify that participants were paying attention and that they possessed the right linguistic skills to qualify as Spanish-speaking Turkers. The following questions are representative in this regard:

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[7] The payment in studies on the demographics of MTurk range from US$ 0.10 to US $3.00 (Ross et al. 2010, US $0.10, Berinsky et al. 2012, US $0.50, Levay et al. 2016, US $2.50 and Huff and Tingley 2015, US $3.00). As noted by Berinsky et al. (2012) and references therein, higher payments appear to decrease the amount of time needed to gather the data but not its quality.

(2)   a.   Su lengua materna es….
                    Your native language is…
        b.   Otros idiomas que habla usted, aparte de su lengua materna (si no
                    Other languages you speak aside from your native language (if it does not
                    se aplica, escriba 'no se aplica'):
                    apply, write 'not applicable')

In order to avoid the overzealous exclusion of participants (see Chandler et al. 2014), the criterion for a successful text entry that was applied was generous, e.g., text entries in English were not excluded from the analysis to avoid excluding L2 participants with low linguistic skills. The following answers are representative of the ones considered unacceptable, leading to the exclusion of the corresponding participants from the analysis:

(3)   *Question:* Su lengua materna es….   *Sample answers:* 29 / s / aaaa / 35 / se /
                    Your native language is…

5. Results

Out of 269 participants who completed the survey, 36 were eliminated since they failed to meet the benchmarks illustrated in (3) successfully. Results are reported in the figures and tables for the sample as a whole as well as for various populations, namely, US workers, workers located outside the US, L1 Spanish workers, and bilingual workers. The differences between these populations are discussed in the main text only when pertinent, but they are provided for each individual researcher to be able to look at those figures separately, as determined by the necessities of their project.

With regard to the location of the respondents (Figure 1), irrespective of their L1, bilingual or L2 proficiency, the majority of the Spanish-speaking Turkers are located in the US (122 workers, 48% of the sample, out of 233). Perhaps more surprising is the well-attested presence of Venezuelan Turkers (51 workers, 21.88%), possibly the result of the ongoing economic and political crisis in the country. The next countries in the number of workers, Mexico and Spain, have a significantly smaller presence on MTurk (14 workers, 6% in both cases). Previous demographic studies have revealed the widespread presence of Indian Turkers (6 workers, 2.57%) and this is seen in the current study, possibly due to the anglo-centric nature of MTurk and to the fact that payments are issued in Indian rupees (and US dollars). The other countries present in the sample are Colombia (6 workers, 2.57%) Argentina (5 workers, 2.14%), the Dominican Republic and UK (3 workers, 1.28%), Canada, Chile, Costa Rica and Macedonia (2 workers, 0.85%). Additionally, there was one respondent for each of the following countries, included in the 'another country' category (4.7%): Brazil, El Salvador, France, Holland, Italy, Nicaragua, Panama, Peru, Portugal, Puerto Rico and Turkey.

*Figure 1. Location of Spanish-speaking Turkers*
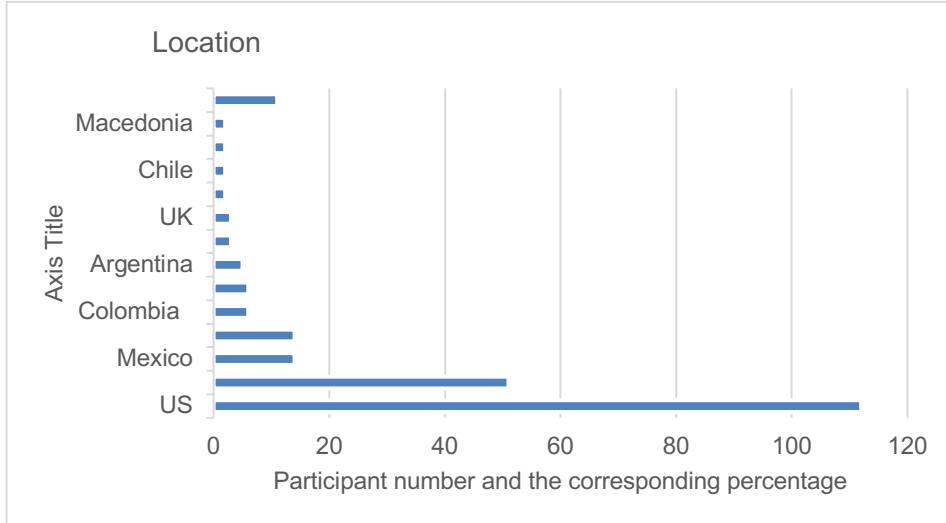
As far as the linguistic profile of the participants is concerned (Figure 2), more than half the participants described themselves as bilingual (53%, 125 speakers; 106 of them being Spanish-English bilinguals, that is to say, 45% of the whole sample; and the other 19, speakers of other languages, 8%, mostly Romance languages). In contrast, 35% of the sample (82 speakers) stated that Spanish and only Spanish was their native language. 12% (27 speakers) stated that Spanish is their L2. The term bilingual in this context applies to respondents who reported having two native languages. This bilingual category is presented as distinct from the L1 category, as the former may include both native and heritage speakers of Spanish, that is to say, two different populations that may be treated differently in certain research projects. At least a subset of the bilingual speakers would qualify as L1 speakers, for instance, bilingual speakers from Spain.

*Figure 2. L1 / L2 / Bilinguals*
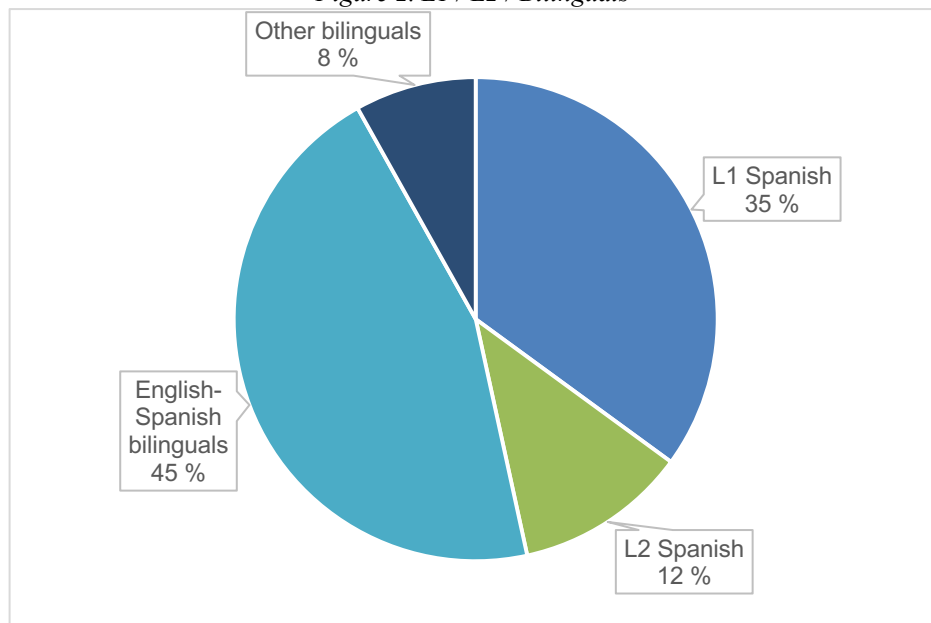
The language pairs available in the sample, irrespective the L1, L2 or L3 status, Figure 3, show that English-Spanish is the most wide-spread language pair (85%, 148

instances in the sample). French (5%, 8 instances), Italian or Portuguese (2%, 4 instances in both cases) are available as well. The sample also included 1 instance of the following languages: Afrikaans, Basque, Japanese, Odia (a language from India), and Turkish.

*Figure 3. Language Pairs (Spanish and Another Language)*
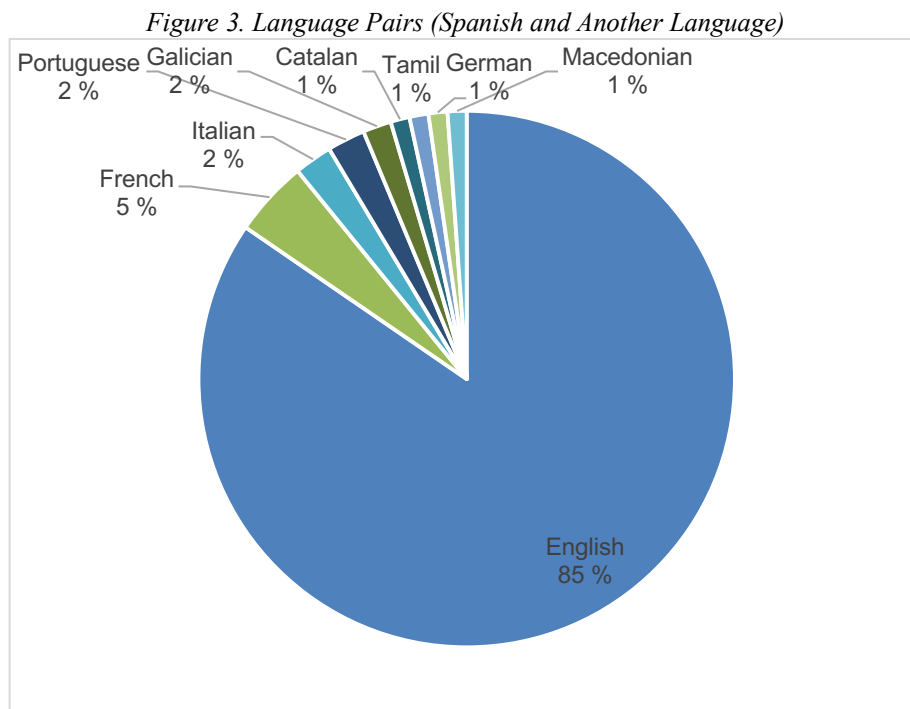
When the percentage of (non-bilingual) L1 data by nationality is considered (Figure 4), Venezuela stands out (42% of the L1 speakers, 34 workers) compared to the US (22%, 18 workers), Mexico (10%, 8 workers) and Spain (6%, 5 workers).

*Figure 4. Location of Non-Bilingual L1 Spanish Workers*
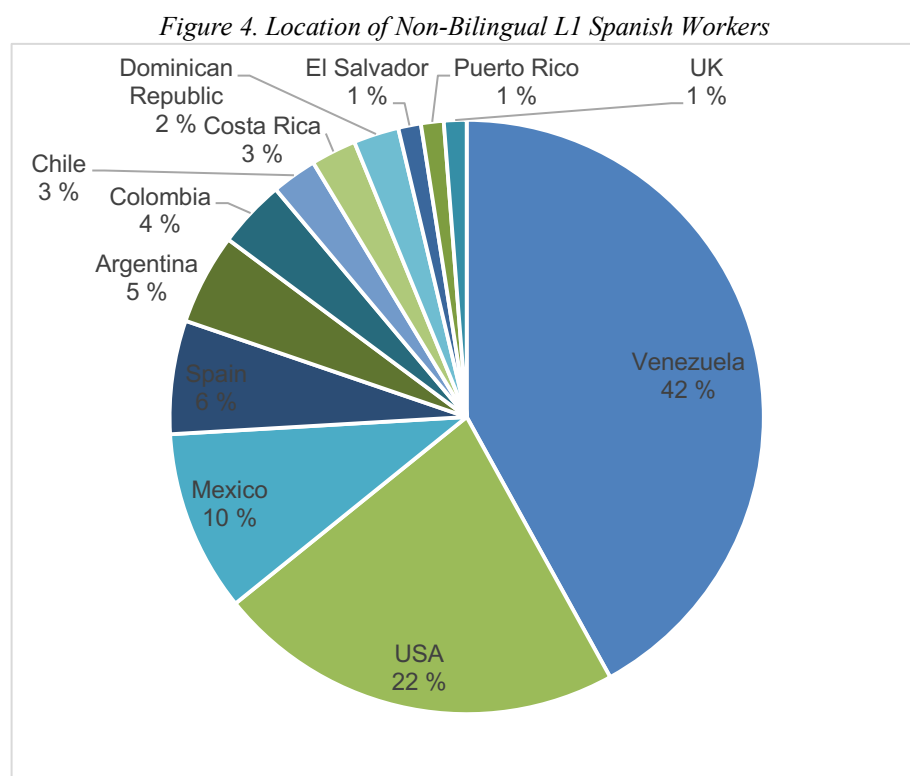
Note that for both the US and Spain a number of participants are bilingual, hence the difference between the corresponding percentages in Figure 4 and Figure 1. In turn, the linguistic profile of US participants (Figure 5) is as follows: US participants for the most part describe themselves as bilingual, 44%, though L1 Spanish (28%) and L1 English (26%) speakers are present, where the latter would be L2 Spanish speakers.

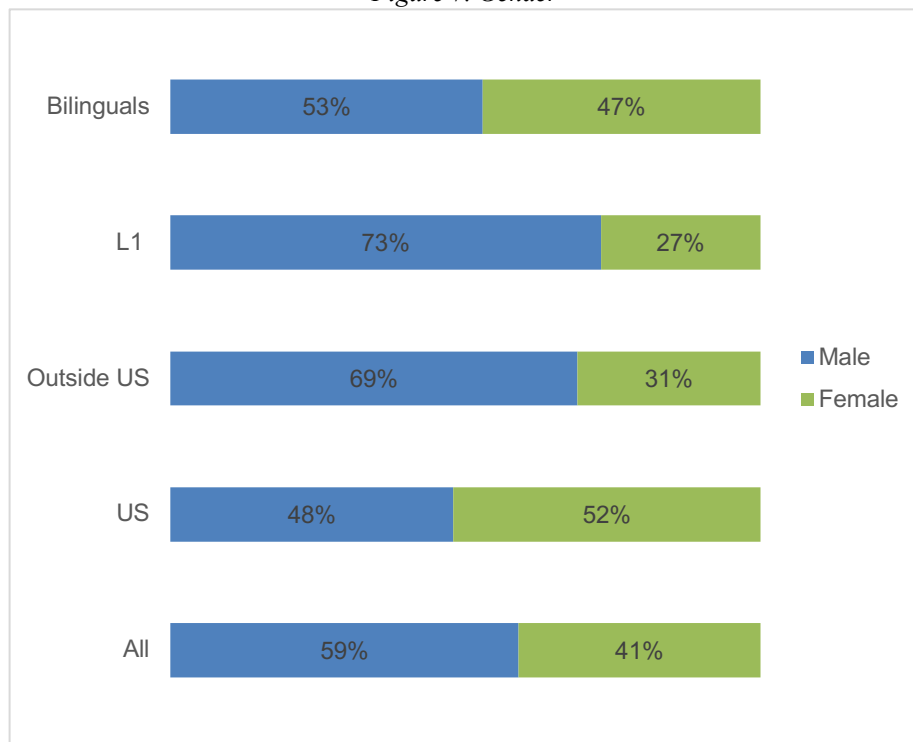*Figure 5. Linguistic Profile of US Respondents*
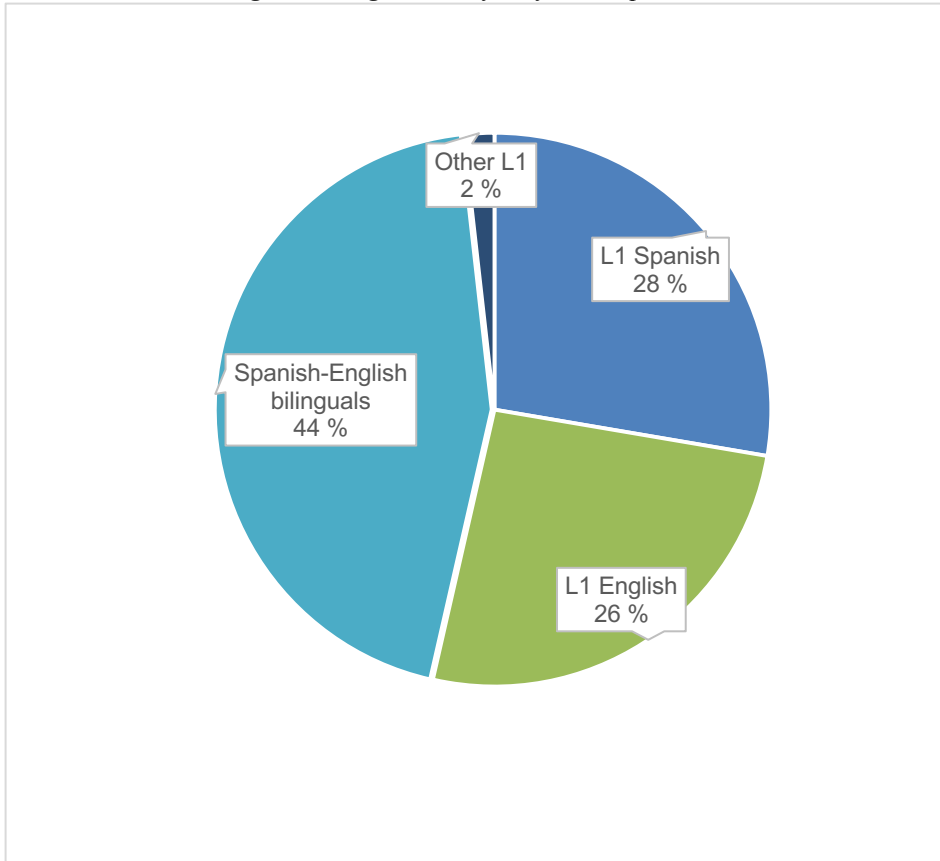
The majority of the respondents are under 40 years, e.g., 80% of the whole population, 81% of the US population and 76% of the L1, Figure 6.

Figure 6. Age
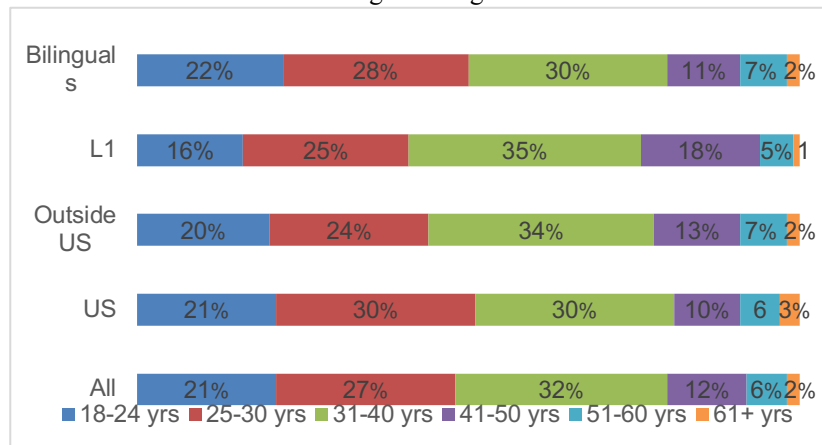
The majority of the respondents are male (59%, Figure 7). This pattern is found in all the categories, e.g., L1 (73%), but for the US (48%).

Figure 7. Gender

The majority of the sample is highly educated (Figure 8): 73% of all the participants have a BA degree or higher educational credentials (53% BA, 18% MA, 3% PhD) and the L1 population is slightly more highly educated than the US population (see also Turner et al.'s 2012 US-based study, which found that Spanish-speaking participants were more highly educated than their English-speaking counterparts).[8]

Figure 8. Education

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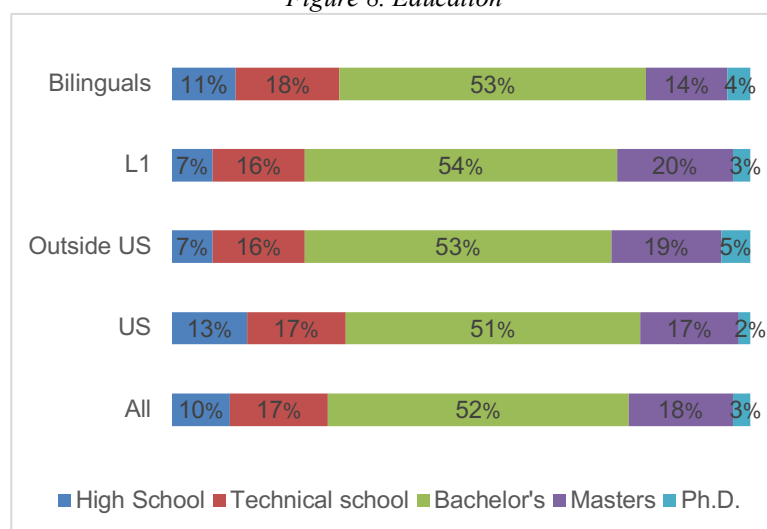
[8] The term 'technical school' in Figure 8 refers to non-university post-secondary education (*formación profesional no universitaria*).

This is a predominantly urban sample (Figure 9); only 16% of the sample live in areas of less than 50,000 people (where 50,000 people or more already makes the area qualify as 'urban area' according to the United Census Bureau; whether such criterion is appropriate for other countries is an open question).

Figure 9. Population of the Workers' Area
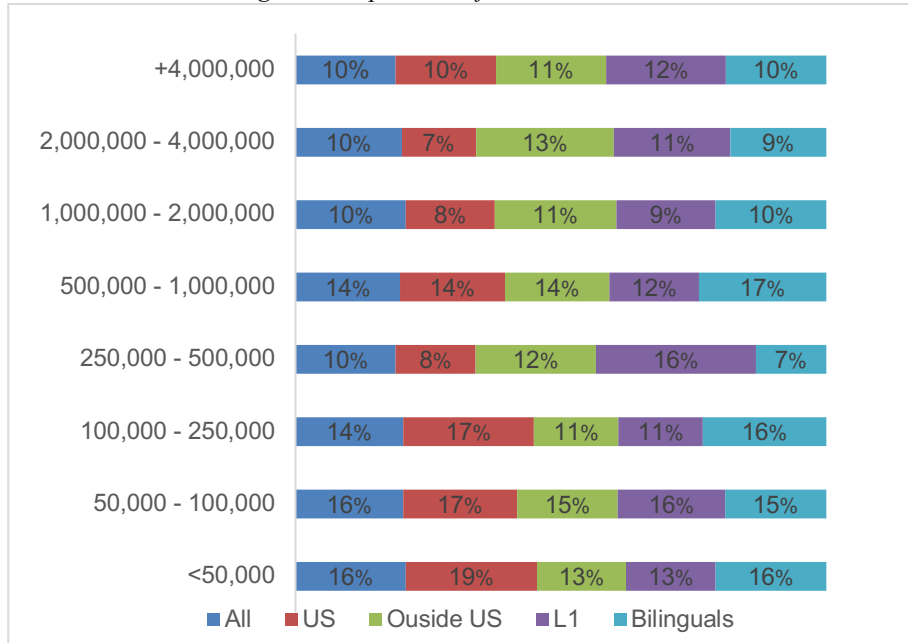
5.1 Work habits

Understanding the work habits of the Turkers when using the platform is crucial (i.) to determine whether the subject pool will meet the needs of the project, e.g., to calculate the time needed to gather the data; (ii.) to make a responsible use of this tool avoiding ethical conflicts, e.g., underpaying workers that are not entitled to a minimum wage or health care coverage. The majority of Spanish-speaking Turkers work less than 5 hours a week (e.g., 39% of the whole sample work 1-5 hours per week and 16% works less 1 hour per week), Figure 10.

Figure 10. Activity per Week
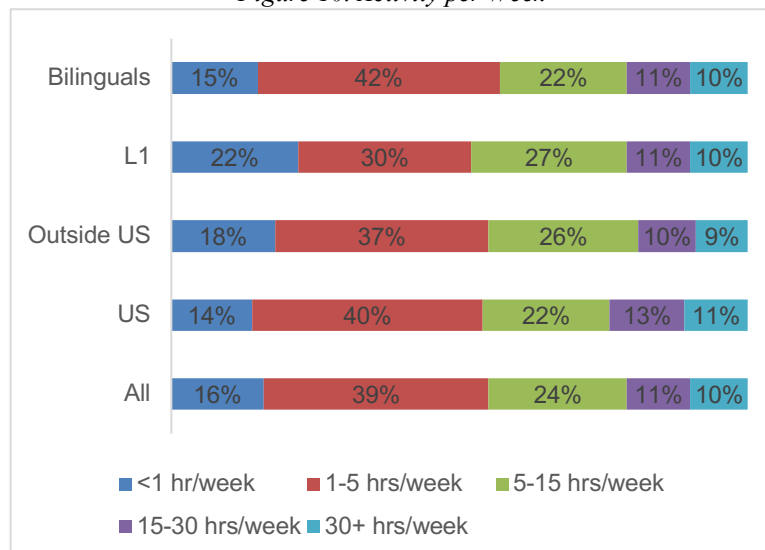
In other words, Spanish-speaking Turkers have a consistent presence in the platform. In fact, 10% of the Spanish-speaking Turkers work 30 hours or more. The latter result is relevant in that it suggests that this subset of the respondents treat MTurk as a relevant source of work.[9] Employment status (Figure 11), which provides still another insight into this issue, yields the following results: 51% of the sample is working full time and 26% is working part time, without any significant differences across conditions. In turn, students (7%) or retired (3%) or unemployed (11%) Turkers are also present. Potentially, MTurk might be a potential source of income for them and for the part time workers (47% of the sample).

Figure 11. Percentage of Employment Status

The results concerning the relevance of the money earned on MTurk (Figure 12) are most relevant in the context of this discussion: In particular, the majority of the sample describes the MTurk money as either irrelevant to them or nice but not something that would change their circumstances (18% and 58%, respectively. Still, 7% of the whole sample considers the money on MTurk to be always necessary to make basic ends meet, less so for the US-based population (5%) than for those outside the US (9%).

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[9] Researchers should bear in mind that the question of how many Turkers treat MTurk as their main source of income is different from the question of who does the majority of the HITs. Fort, Adda and Cohen (2011; see also references therein) have argued that the majority of the HITs (80%) are done by a subset of the worker population (0.6-1.7%), sometimes referred to as professional Turkers, who are not entitled to any employment benefits.

Figure 12. The Money on MTurk Is…
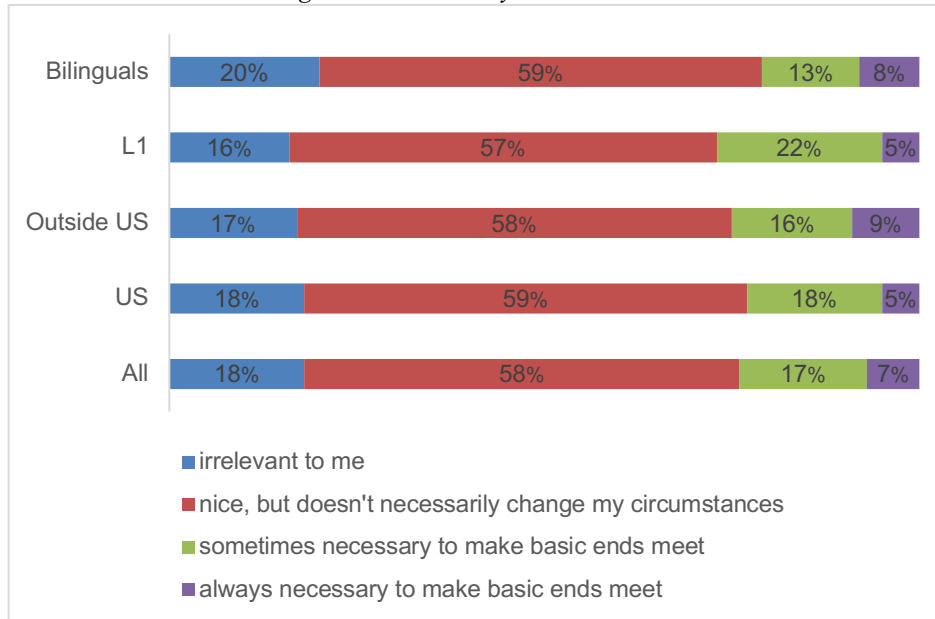
With regard to the kind of tasks the respondents chose to complete (Figure 13), the most popular HIT is surveys – maybe unsurprisingly, as only those likely to answer surveys would have participated in a research like this (see Ross et al. 2010: 3; participants were informed that they could mark more than one option if applicable). The second most popular projects are image-related works and data gathering. There is a slight tendency for L1 workers to answer writing tasks and audio transcriptions less often than the rest of the groups, possibly because such HITs may call for stronger English skills, as Spanish language HITs are comparatively less present in the platform.

The occupation of the participants (Table 2), which provides a glimpse on their socio-economic status (questions adapted from Huff and Tingley 2017) reveals that the biggest group corresponds to professionals (educators, lawyers, etc., 25%), followed by office and administrative support (15%), thus underscoring the relatively high educational level and social status of the sample.[10]

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[10] In the questionnaire, participants were allowed to choose 'another area' if the suggested categories did not apply to them (see Table 2, 33% of the sample). It remains to be determined what the occupations of the participants who chose this category is.

Table 2. Occupation

Occupation	All	US	Outside US	L1	Bilinguals
Administration	10%	7%	13%	8%	13%
Professionals	25%	24%	27%	29%	23%
Installation, maintenance and repair	4%	5%	3%	5%	5%
Office and administrative support	15%	18%	11%	17%	12%
Business owner	2%	2%	2%	1%	2%
Food preparation and service	2%	3%	0%	1%	1%
Manager	8%	8%	8%	10%	6%
Protective service	2%	1%	3%	0%	2%
Grounds cleaning and maintenance	0%	1%	0%	0%	1%
Another area	32%	31%	33%	29%	35%

6. Discussion and recommendations for Hispanic Linguistics projects on MTurk

The main result of this study is that the platform provides convenient access to various profiles of Spanish-speaking workers, including L1 speakers located in Hispanic countries and in the US (35%), Spanish-English bilingual speakers (with two native languages 45%) and L2 Spanish speakers (12%), Figure 2. In particular, the presence of Venezuelan Turkers (22%, Figure 1) might be relevant for projects needing a geographically homogeneous sample of L1 speakers educated in a Spanish-speaking environment. Within the US, MTurk provides access to both L1 Spanish workers (28% of the US workers) and Spanish-English bilinguals (44%). Researchers wanting to recruit Spanish-speaking participants in the US may want to consider (i.) whether the pervasive exposure to English and potential lack of schooling in Spanish may affect the results; and (ii.) that various dialects are spoken in the country (mostly Mexican, Puerto Rican and Cuban Spanish, on top of Spanish as a heritage language) and whether potential dialect levelling processes may affect their results. Depending on the research project, however, this might not constitute a problem but rather an opportunity (see section 6.1 on Hispanic Linguistics projects developed on MTurk).

The information concerning language pairs (Figure 3) may inform projects on bilingualism. In particular, while the overwhelming majority of the workers know both English and Spanish, the pair French and Spanish is also present in the sample, for instance, though in significantly lower numbers. Furthermore, the educational level of the sample is particularly high (73% of the sample has a BA degree or higher educational credentials, Figure 8). This might not be an issue given that a significant amount of experimental research in linguistics and beyond tends to be done with university students, that is to say, highly educated subjects as well (see Berinsky et al. 2012: 352). Nonetheless, the consequence is that any dialectological projects to be developed on MTurk may study variations in the standard language rather than non-standard varieties (under the reasonable assumption that a high educational level correlates with the use of standard varieties). Still another limitation for the study of microvariation is as follows: The option of using IP restrictions to target specific regions/states within a country is as of today only available within the US. Thus, a dialectologist interested in a region within a Hispanic country would have to collect IP

addresses and geolocate the Turkers to build an appropriate subject pool or to filter the results (see section 2.1). Also, researchers should bear in mind that while their projects might be posted from Europe (including Spain), the US (including Puerto Rico) and Chile, Latin American countries other than Chile are as of the date of writing (2019) excluded (section 2; in contrast, there is not restriction on the location of the workers). It is expected that more countries will be gradually added. Projects in sociolinguistics (and opinion mining) should evaluate whether the relatively young Spanish-speaking Turker population (see Figure 6) is appropriate for their research. A similar concern regarding gender (59% of respondents were male, Figure 7) or the predominantly urban nature of the workforce (Figure 9; only 16% live in rural areas) may apply to sociolinguistic research, which benefits from a diverse sample in many cases. Researchers or job givers interested in using MTurk for translation projects should bear in mind that the average worker has no professional training in translation (though Zaidan and Callison-Bruch 2011 for discussion on how to improve the quality of translation tasks on MTurk). Moreover, alternative marketplaces specializing in translations are available, e.g., Gengo (https://gengo.com/).

The results also reveal that Spanish-speaking workers use the platform periodically (see Figure 10 for their weekly activities, e.g., 39% of the sample works 1-5 hours a week and 24% works 5-15 hours). While the majority of the workers are not using MTurk as a full-time job (only 10% of the sample works 30+ hours a week on MTurk), still, 7% of the sample reports that the money on MTurk is always necessary to make basic ends meet (9% in the case of workers located outside the US). This is a non-trivial result that should help researchers make ethical decision concerning participant payment. In turn, employment status also hints that part of the Turkers might be in a less than ideal economic situation: Figure 11 shows that only 51% of the sample is working full time, compared part-time workers (26%), students (7%) or those who have retired (3%) or are unemployed (11%).

Questions arise concerning the reliability of the results and the self-reported linguistic skills. An indirect glimpse into this issue can be gained by looking at the use of accents and *ñ*´s in the text entries. These were used overwhelmingly by the L1 Spanish group, and by more than 50% of the bilingual group, even though computer keyboards may make it difficult for those located in non-Hispanic countries to use those symbols (see also Paolacci and Chandler 2014: 186 and references therein for a data-driven defense of the honesty of Turkers when answering surveys; see also Fort, Adda and Cohen 2011: 416). In this context it is interesting to notice that the location results are consistent with Pavlick et al.'s (2014) study which found 122 Spanish speakers in the US, 16 in Mexico and 14 in Spain – the current research adds the presence of Venezuelan Turkers, also noted by Nagle (2019). In turn, the high percentage of female Spanish-speaking Turkers in the US is consistent with Huff and Tingley's (2015: 7) US-study, which showed that MTurk is 'relatively strong in attracting young Hispanic females', when compared to the Cooperative Congressional Election Survey (for an overview of previous research on the gender of US Turkers, see Levay et al 2016: 4). This being said, the categories 'Spanish-speaking' vs. 'Hispanic', though closely-related, do not completely overlap, as not all Hispanics may speak Spanish, nor is Spanish spoken only by Hispanics.

A note of caution is in order: as discussed by Ross et al. (2010), the Turker population may vary across time (e.g., depending on the state of the economy in each country and whether more profitable job opportunities become available). Additionally, as these researchers discuss, the self-selection bias inherent in this kind of study means that this kind of research by definition provides a partial picture of the Spanish-speaking

Turkers. Moreover, successful recruitment might be determined by the payment and/or by the period of time an experiment is available (days, weeks, etc.). For instance, the present study found 14 participants from Mexico and Spain, respectively, whereas Guajardo (2017) managed to recruit 38 participants from each country.

6.1   Previous Hispanic Linguistics projects developed using MTurk

As noted, researchers would benefit from finding – in one place – information on the projects that have been successfully developed on MTurk. Table 1 already noted a small number of Hispanic Linguistic investigations relevant in this context. This section discusses the main features of these studies: Fuchs et al. (2015) studied the behavior of number and gender under agreement attraction in Spanish to establish whether the grammar treats those two categories in the same way in the so-called phi-feature hierarchy. In their study, 126 speakers answered a demographic questionnaire to determine whether they were native speakers. Thus, their research stands out in that it shows the possibility of working on Spanish within the US. In turn, Guajardo (2017) used the global nature of MTurk to study the Sequence of Tenses phenomenon in 3 different dialects (Argentina, Mexico and Spain), establishing differences in the strictness of this constraint across dialects. Guajuardo recruited participants through MTurk in the case of Mexico and Spain (38 each), but for Argentina, he chose to use social media for this purpose, since he expected fewer workers to be available in that country. Guajardo's work highlights, on the one hand, the limitations that MTurk may have when recruiting subjects from a country as Argentina. Nonetheless, his work also underscores the fact that MTurk is useful for the study of microvariation in spite of the high educational profile of the workers. Still another line of research has taken advantage of the access to a bilingual population that MTurk provides: For instance, Stadthagen et al. (2019) studied the behavior of adjective-noun word order in Spanish-English code-switching. Thus, language contact, a reality for US Turkers, is treated as an opportunity, not a limitation. Moreover, Stadthagen et al. (2019) recruited 80 bilinguals who spoke the Mexican variety of Spanish, thus underscoring the fact that MTurk can be used to recruit participants with a highly specific profile.[11] These three case studies were based on acceptability judgment tasks as part of theoretical syntax research. Finally, Nagle (2019) conducted a recent validation project focusing on ratings for L2 Spanish speech samples. Specifically, native speakers of Spanish were recruited on MTurk to rate the said samples for comprehensibility, fluency and accentedness. Reliable outcomes were obtained for the two first factors, and less so for the third one, which lead the author to make recommendations for future projects. As noted in section 3, Nagle recruited 54 native speakers of Spanish, 22 from Venezuela, 10 from Mexico, 8 from Colombia and 5 from Spain.

To conclude, the variety of topics researched so far using MTurk and their different use of this participant pool illustrate the versality of this marketplace for research in Hispanic Linguistics.

7. Future research

Future research is needed concerning the exact linguistic profile of Spanish-speaking US Turkers, e.g., what percentage of them has had schooling in Spanish and what variety of Spanish do they speak. The demographics of Puerto Rican Turkers also merit

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[11] See also Stadthagen et al. (2018) and Parafita Couto and Stadthagen (2017) for closely-related research on the topic of codeswitching, using acceptability judgments as well. See Table 1 for information concerning the number of participants in those studies.

a closer look as the survey did not include language to separate Puerto Rican respondents from the general US respondents (though occasionally participants used Puerto Rico when the answers had to be typed; e.g., 1% of the respondents are located in Puerto Rico as seen in Figure 4). Moreover, since the emphasis in this paper is on Hispanic Linguistics, the appropriateness of MTurk is determined by validation studies (see Nagle 2019 for a case-study in L2 Spanish research). In contrast, opinion mining projects tend to benefit from the availability of comparisons between the demographics of the sample and the general population to ensure that the sample is representative, a task that is beyond the scope of this article, particularly given the international nature of the sample.

8. Conclusion

After a basic introduction to MTurk and the issues that arise in the use of crowdsourcing for linguistic research, this paper presented the first detailed study of the Spanish-speaking workers on this platform. The emphasis has been put on factors relevant to the field of linguistics to help researchers decide whether this platform provides the right environment for their projects, though other fields may benefit from this work. Information on work habits and the relevance of MTurk for the economy of the workers was also included. The main results are that MTurk already provides access to a large pool of Spanish-speakers who use the platform regularly. Therefore, the platform might be appealing for a wide variety of research enterprises focusing on Spanish. The biggest L1 (non-bilingual) Spanish population is found in Venezuela, whereas the US provides access to a large bilingual population. Furthermore, as noted in the research on the demographics of the Turkers, they tend to be young and highly educated; this applies to their Spanish-speaking peers as well. This may limit the usefulness of the platform for projects which need a more diverse sample or access to non-standard varieties. While the majority of the Spanish-speaking Turkers use the platform as a source of additional income, not as their main source of income, still professional Turkers are attested in the sample, a fact that should help researchers make ethical decisions concerning participant payment. Within Latin America, research projects might be posted from Chile (and Puerto Rico) but not from the rest of the Latin American countries as of the date of writing. The US and Europe do not have such a restriction, nor is the location of the workers subject to any restrictions. A brief note on previously successful projects using MTurk for Hispanic Linguistics is included as well.

Iván Ortega-Santos
Department of World Languages and Literatures
College of Arts and Sciences
University of Memphis
108 Jones Hall
Memphis, TN 38152
USA
rtgsntos@memphis.edu

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Appendix: Questionnaire

General background questions and inquiries about work habits were translated and/or adapted from the literature on MTurk demographics, particularly, Ross et al. (2010), questions (1-3), (8-9) and (11-13), and Huff and Tingley (2015), questions (7) and (10). Glosses in general come from those works. The questions on language knowledge were created for the survey. Unless otherwise noted, participants could only choose one answer for each question.

(1)   Género o sexo:

Gender

o   Masculino

Male

o   Femenino

Female

(2)   Edad:

Age

o   18-24 años

18-24 years

o   25-30 años

25-30 years

o   31-40 años

31-40 years

o   41-50 años

41-50 years

o   51-60 años

51-60 years

  o 61+

  61+

(3) País donde vive: _____

Country of residence

(4) Lengua materna:

Native language

  o Soy hablante nativo de solo una lengua

  I speak only one language natively

  o Soy hablante nativo de dos o más lenguas (por ejemplo, aprendí español en la familia y otra lengua fuera de la casa o aprendí dos lenguas dentro de la familia)
  I am a native speaker of two or more languages (for instance, I learnt Spanish from my family and another language outside my household or I learnt two languages from my family)

(5) a. Su lengua materna es.... _____

   My native language is

  b. ¿Cuáles son sus lenguas maternas? _____

   Which languages do you speak natively?

(6) Otros idiomas que habla usted, aparte de su lengua materna (si no se aplica, escriba 'no se aplica'): _____

What other languages do you speak, other than your native language (if not applicable, write 'not applicable')

(7) Número de habitantes del área donde vive (en caso de vivir en el suburbio de un núcleo urbano, considere la población total del núcleo urbano, no del suburbio):

Population in the area where I live (if you leave in a suburb, please include the population of the urban area, not the suburb):

  o Menos de 50 mil

  Less than 50 thousand

o 50 mil - 100 mil

50 thousand - 100 thousand

o 100 mil - 250 mil

100 thousand- 250 thousand

o 250 mil - 500 mil

250 thousand - 500 thousand

o 500 mil - 1 millón

500 thousand - 1 million

o 1 millón - 2 millones

1 million - 2 millions

o 2 millones - 4 millones

2 millions- 4 millions

o Más de 4 millones

More than 4 millions

(8)　Grado o título educativo más alto que ha alcanzado:

What is the highest educational degree you have completed?

o Enseñanza básica

Elementary education

o Enseñanza media o secundaria

Secondary education

o Formación profesional (no universitaria)

Vocational school

o Licenciatura universitaria

Bachelors degree

o Máster

Masters

- o Doctorado

  Ph.D.

(9) Situación laboral:

  Employment status

- o Trabajando a tiempo completo

  Full-time employee

- o Trabajando a tiempo parcial

  Part time employee

- o Desempleado

  Unemployed

- o Jubilado

  Retired

- o Permanentemente discapacitado

  Disabled

- o Estudiante

  Student

(10) Ocupación o trabajo:

  Occupation

- o Administración

  Administration

- o Oficina y apoyo administrativo

  Office and administrative support

- o Servicios de protección

  Protective service

- o Preparación y venta de alimentos

  Food preparation and service

o Instalación, mantenimiento y reparación

Installation, maintenance and repair

o Limpieza y mantenimiento del terreno

Grounds cleaning and maintenance

o Profesional (educador, abogado, etc.)

Professional (educator, lawyer, etc.)

o Propietario de negocio

Business owner

o Manager

Manager

o Otra área de trabajo

Another area

(11) El dinero que gano de MTurk es ....

The money I make on MTurk is

o irrelevante

irrelevant

o agradable pero no cambia mis circunstancias económicas

nice, but doesn't materially change my circumstances

o a veces necesario para cubrir mis necesidades básicas

sometimes necessary to make basic ends meet

o siempre necesario para cubrir mis necesidades básicas

always necessary to make basic ends meet

(12) ¿Con qué frecuencia hace trabajos, etc., en MTurk?

How often do you use MTurk?

o Menos de 1 hora a la semana

Less than 1 hour per week

- o 1-5 horas a la semana

  1-5 hours per week

- o 5-15 horas a la semana

  5-15 hours per week

- o 15-30 horas a la semana

  15-30 hours per week

- o Más de 30 horas a la semana

  More than 30 hours per week

(13) ¿Qué clase de HITs completa usted? (Nota: Puede seleccionar varias opciones)

  Tasks you usually complete on MTurk (Note: You may select more than one option)

- o Recogida de datos (por ejemplo, la información de contacto en una web)

  Finding information (ex. the contact information on a website)

- o Trabajo con imágenes (descripción, filtrado/moderación, transcripción de su contenido, etc.)

  Tasks involving images (descriptions, filtering, transcribing its content)

- o Escritura (escribir resúmenes, evaluaciones, editar textos, etc.)

  Writing tasks (summaries, evaluations, editing, etc.)

- o Transcripciones de audio

  Audio transcriptions

- o Encuestas

  Surveys

- o Otros

  Other tasks