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Language effect on decision-making. A study on a Central Italian dialect.

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Introduction

A consistent body of research showed that language can modulate people's information processing and their decisions. Most of the studies exploring the effect of language on decisions considered exclusively late bilingualism, a linguistic condition in which speakers learn a language only after the acquisition of a first tongue. It has been shown that late bilinguals make different choices when decision problems are presented in the native language, with respect to when the problems are presented in a foreign language. In particular, it seems that decision biases in the native language are diminished by the use of a foreign language. This phenomenon goes under the name of Foreign Language Effect.

Recently, a work run by Mello, Miozzo and Peressotti (2017) focused on a different type of bilingualism, the Italian-Venetian bilingualism, a peculiar linguistic condition of Italy in which both codes are acquired simultaneously and co-exist in a dilalic relationship.

The authors showed that even in this case, a language effect was observed, similar to the Foreign language effect: decisions varied according to the language used, so that biases diminished in the Venetian condition with respect to the Italian condition.

The decision problems used by Mello et al. (2017), and also by studies showing the foreign language effect, involved the estimation of quantities via the computation of numerical information, so that Mello et al. (*ibid.*) interpreted this result as the consequence of a different access to numerical information in Italian and Venetian.

In other words, the difference in the decisions made using the two languages might be due to the fact that Venetian is not the language used in the acquisition of arithmetic.

Therefore, the information accessed by people when computing quantities in Venetian might differ with respect to the information accessed in Italian.

In order to assess the validity of this hypothesis and to investigate whether the results found in Mello et al. (2017) might be generalized to other Italian dialects, the present research involved Italian-Osimano bilinguals, who acquired both linguistic systems in early age and use both codes daily, in different social contexts.

In the current study, the following tests were used: (a) the Asian Disease problem (Tversky & Kahneman, 1981), to directly compare the results of the present study with those obtained with Italian-Venetian speakers; (b) a Basic Arithmetic problem (Lipkus et al., 2001), a numeracy task which requires basic mathematical operations; (c) the Bowls problem (Denes-Raj et al., 1994), a numeracy task which investigates how individuals compute probabilistic information and finally (d) the Ticket-Money Loss problem (Tversky and Kahneman, 1981), an accounting test that investigates how people consider psychological accounting of outcomes, which was used as a control task.

According to Mello et al. (2017)'s hypothesis, due to a different access to numerical information, a difference should be found between Italian and Osimano in tasks involving numeracy abilities, i.e., the Basic Arithmetic problem and the Bowls problem.

In the Asian disease problem, that also requires the computation of quantities and percentages, the same pattern as in Italian-Venetian, i.e. a diminished framing effect in Osimano with respect to Italian, is expected.

Finally, in the Ticket- Money loss problem, we expect a framing effect not modulated by language, given that this task does not require numerical computations

The present study is articulated as follows: chapter 1 is dedicated to the literature review concerning reasoning systems and decision making. More specifically, it explores internal and external factors that are crucial when making decisions. Particular attention is given to language, which resulted to be critical in modulating information processing and decision making. The different approaches put forward to account for the language effect will be reported and discussed.

Chapter 2 provides linguistic and sociolinguistic features of Osimano. The first section is dedicated to a brief historical introduction of the variant, whereas the rest of chapter contextualizes Osimano in its sociolinguistic environment and analyses it from a formal point of view (i.e., phonetically, morphologically and syntactically).

Chapter 3 describes the experiment conducted in the current research. First of all, the aims of the study are presented, followed by the crucial information concerning methodological aspects. The chapter then reports the collected results and an analysis of them. Finally, the analysis of results is compared with initial predictions.

1. Two systems model

A consistent number of studies has shown that human reasoning does not always relies on analytic and systematic processes, but it often depends on intuitive, heuristic and nonrational ones.

According to the dual-process model (Epstein 1994; Evans 2007, 2010; 2012; Sloman 1996; Stanovich 1999) there might be two distinct cognitive systems which compete for the control of our reasoning, judgment and thus decision-making. The first is called System 1 (or intuitive System)¹, older and shared with other animals, it includes innate input modules that make the processes more rapid, automatic, intuitive and unconscious. The second is called System 2 (or rational System), more recent in evolutionary terms, which is effortful, analytic, deliberate and provides human with hypothetical thinking that otherwise could not be achieved by System 1.

Because of the working memory capacity restriction, as this latter system is controlled and conscious, it requires high effort, it is slower in operation and it cannot pay attention to other matters.

On the contrary, because of its speed and efficiency, the intuitive System often precedes and thus neutralizes the rational System response, but this last is able to override intuitive and associative System 1's responses. Apparently, reasoning biases are likely to appear when System 1 is activated and, as just mentioned, they can be eventually inhibited only by the intervention of the other system (Evans, 2012). The two systems have

¹ According to Stanovich (2004, 2011) the term should be plural, since it refers to several different systems in the brain. For that reason, many solutions have been proposed, such as "TASS" (i.e., the autonomous set of systems) for the System 1 or simply "Type 1 or 2" processing.

complementary functions and can generate different responses to a reasoning problem, even at the same time (Sloman, 1996).

Several neuropsychological studies on belief bias proved the existence of a dual mechanisms system. In fact, neural imagining studies observed that when reason-based responses were reported, the neural correlates were different from when belief-biased responses were reported.

Among others, Goel et al. (2000; 2003), using fMRI, showed the activation of two distinct brain areas, according to the type of the occurring process. When subjects had to suppress a belief-bias response to correctly complete a logical task right lateral prefrontal cortex was engaged. Conversely, when a belief-bias response took over logical reasoning, a remarkable activation of ventral-medial prefrontal cortex, usually involved in the affective processing, was observed (see also De Neys et al., 2008, Houdé et al., 2001; Tsujii et al., 2009 for converging evidence).

Furthermore, neural imaging studies on decision making, support the existence of dual processing by reporting that different neurological systems are linked with monetary decisions made on immediate or deferred reward.

McClure et al. (2004) reported the activation of the prefrontal and frontal cortical regions when processing was carried out by System 2 (i.e., deferred reward), whereas the limbic system was associated to immediate decisions.

1.1. Decision-making: crucial factors

The reason why a system is operating rather than the other is not clear yet. A consistent body of research suggests that it might depend on a complex interplay of factors.

1.1.1. Availability and believable conclusions

Sloman (1996) suggested that the availability of information (i.e., retrievability of relevant information from memory) is crucial for observing the belief-bias effect in syllogistic reasoning. In other words, what the author observed was that the easier an example could be recalled, the more was considered to be important and reliable.

Similarly, Evans et al. (1983) in a study on syllogistic reasoning observed that when dealing with a problem, people tended to accept invalid but believable conclusions, whereas they were likely to be more sensitive to logical validity with unbelievable problems. In other words, participants showed a consistent tendency to consider more irrelevant information when accepting invalid but believable conclusions, rather than when they had to deal with valid but unbelievable conclusions in a syllogism.

1.1.2. Mood and attitude

Schwarz and Clore (1983; 2003) considered feelings as experiential sources of information. They assumed that in evaluative judgments people normally take into account their own feelings and that this might lead them to consider their current feelings as a response to the object of judgment. The choice would then depend on their mood, unless their feelings were discredited. In other words, mood appears to modulate the criterion of judgment, especially when the source of people's mood is not in the focus of their attention.

In their 1983 study, they showed that sad moods were likely to foster systematic processing, while, happy moods were likely to foster an intuitive processing accompanied by less focused attention. In their experiments, they found also that the impact of sad mood could be eliminated if participants were induced to attribute their mood to a specific source.

On the contrary, the impact of happy mood did not seem to be modulated by an external-cause attribution. They interpreted these findings by claiming that sad mood is a deviation from the normal state of the organism which tends to be mildly positive.

Thereby, for such reason it requires an explanation, and this might interfere with other cognitive tasks.

In line with this argument, according to Ajzen et al. (1999) individuals' behaviours might depend on evaluative responses or attitudes, which normally predispose them to decisions and actions, according to the valence of their attitude. Thus, positive attitudes predispose to produce an approach tendency, while negative attitudes predispose to produce an avoidance tendency.

A large number of personal and contextual factors can modulate the elements on which the evaluative response depends. When positive beliefs are made more accessible by the bias, attitudes and behaviours will slide in favourable directions; on the contrary, when negative beliefs are made more accessible by biases, attitudes and behaviours will slide to the opposite direction.

1.1.3. Time pressure

Payne et al. (1988)'s study reported in their experiment an interesting finding: under time pressure, individuals showed an acceleration of processing which led them to operate a significant selection and to concentrate on the most relevant attributes of the problem. At the same time, time constraint had impact on accuracy: accuracy appeared to be lower under time pressure.

Evans & Curtis-Holmes (2005) found an analogous pattern: in their experiments, belief bias was likely to increase, and logical accuracy decreased when individuals operated under time pressure.

In conclusion, these studies showed that decision making is sensitive to the variable of time pressure.

1.1.4. Cognitive effort

Shah & Oppenheimer (2008) argued the reason as to why decision makers use heuristics, might be because they reduce cognitive effort associated with a task. Normally, judgment and decision-making demand a considerable amount of cognitive capacity and effort, and since individuals most of the time tend to save cognitive resources (especially when they consider that, in a decision, the effort to find the best course of action is not worth it), they rely on one or more of the following methods for effort reduction: (a) Examining fewer cues; (b) Reducing the difficulty related to the retrieving of cue values; (b) Simplifying the weighting principles for cues; (c) Integrating less information; and finally (d) Examining fewer alternatives. These arguments would suggest a tendency in effort saving while making decisions.

Alter et al. (2007) posited that people tend to use more elaborate reasoning processes when experiential cues suggest that System 1 judgments might be faulty, thus when more elaborate reasoning processes are required.

1.1.5. Language: Foreign language effect

In the last decade, a large body of research showed that language may play a prominent role in judgment and decision-making (Costa et al. 2014; Gao, Zika, Rogers, & Thierry, 2015; Geipel et al., 2015a; Keysar et al. 2012; Oganian et al. 2016). All these

studies corroborated this hypothesis by showing that decisions seem to be less exposed to biases and taken more rationally when processed in a foreign language (i.e., a non-native language mainly learnt in a classroom context and used outside of the community where it is commonly used by native language speakers).

This phenomenon is known as Foreign Language Effect (FLe) and its nature is still unclear. The FLe has been investigated across many tasks: one of these tasks is the well-known Asian Disease problem (Tversky & Kahneman, 1981). This problem requires people to decide between two medicines with similar outcomes in order to face the propagation of a mortal disease. The problem can be framed according two different versions: gain or loss.

Gain frame: Recently, a dangerous new disease has been going around. Without medicine, 600,000 people will die from it. In order to save these people, two types of medicine are being made. If you choose Medicine A, 200,000 people will be saved.

If you choose Medicine B, there is a 33.3% chance that 600,000 people will be saved and a 66.6% chance that no one will be saved. Which medicine do you choose?

Loss frame: Recently, a dangerous new disease has been going around. Without medicine, 600,000 people will die from it. In order to save these people, two types of medicine are being made. If you choose Medicine A, 400,000 people will die.

If you choose Medicine B, there is a 33.3% chance that no one will die and a 66.6% chance that 600,000 will die. Which medicine do you choose?

According to a rational approach, the two frames are equivalent, since they describe objectively the same situation, thus they should lead to similar decisions. However, the two frames present the outcome in positive (i.e., saved lives) or in negative (i.e., lost lives) terms, which normally leads to inconsistent responses. In fact, what usually happens is that people tend to select the option with certain outcome (i.e., Medicine A), when presented with positively framed version (i.e., when it is sure that one-third of the lives will be saved versus a one-third chance of saving all the lives and a two-thirds chance of

saving no one) of the task, whereas, they tend to choose the riskier option (i.e., Medicine B), when given the negatively framed version (i.e., when there is a sure loss of two-thirds of people versus a one-third possibility of losing no lives and a two-thirds chance of losing everyone).

In other words, they appeared to manifest a risk aversion in the domain of gains and they seemed to be risk seeking in the domain of losses.

According to the Prospect theory (Kahneman & Tversky, 1979), this pattern arises from the fact that, when making a decision, outcomes are considered as positive or negative deviations (i.e., gains or losses) from a reference outcome and the reference outcome is modulated by frame. Zero lives saved is the worst outcome in the gain frame, but it is the best outcome in the loss frame (no one dies). Therefore, the risky choice that is perceived as nearer to 0 than the safe option is preferred in the loss frame and avoided in the gain frame.

Critically, as it will be shown in the next paragraph, this framing effect was reduced or even disappeared when people performed the task in a foreign language: in that case, the safe option was chosen equally often in the gain and in the loss frame, suggesting that language could modulate their decision-making processes.

The FLe arose in many decision contexts, such as the Asian Disease problem, the Holt–Laury test, the Discount problem, the Ellsberg’s paradox and the like (Costa 2014).

This has been explained under several accounts.

1.1.5.1. Emotional accounts

In their seminal work, Keysar et al. (2012) analysed how decision are taken when using a foreign language.

They argued that, since a foreign language is harder to use, it might affect decision making in two opposite ways. According to a first hypothesis, the use of a foreign language might reduce the systematicity in information processing, and, in this way, exacerbate biased decisions arising from heuristics and affective processes. If this is the case, the decisional biases should be more frequent when using a foreign language.

According to a second hypothesis, the use of a foreign language might enhance the reliance on systematic processing, and, in this way, lead to a reduction of the proportion of decisional biases. To distinguish between these two alternative hypotheses, Keysar et al. (2012) presented the Asian disease problem to three different groups of bilinguals (involving five different languages).

In presenting participants with (only one frame of) the problem, in either their native or their foreign language condition, they observed that when the problem was described in the native language, participants chose the safe outcome more often than the risky option in the gain frame, but not in the loss frame, replicating the well-known framing effect (Kahneman & Tversky, 1979).

However, when the problem was presented in a foreign language, such framing effect disappeared, and participants chose the safe option in the gain frame as frequently as in the loss frame. Thus, this effect was absent in the foreign language condition, whereas it persisted in the native language condition.

This behaviour has been interpreted as due to a diminished loss aversion bias in the gain frame. Keysar et al. (2012) obtained a similar effect in further experiments in which it was shown that participants were more prone to accept risky bets in foreign than in native language. The results overall showed that using a foreign language dampens, or

even eliminates, the framing effect, i.e. reduces the decision bias, thus supporting the hypothesis of an enhancement of System 2 processing.

In other words, thinking in a foreign language “provides a distancing mechanism which drives people from an immediate intuitive system to a more deliberate mode of thinking” (*ibid.*), allowing them to rely on analytic processes, thereby reducing decision biases.

The authors suggested that foreign language could be less grounded in the emotional system than the native tongue, which might lead to a more deliberate mode of processing, eventually resulting in more systematic decisions.

As a matter of fact, a remarkable body of studies had previously observed emotional differences between native and foreign languages (Ayçiçeği et al., 2004; Dewaele, 2004; Harris et al., 2003; Puntoni et al., 2009).

For instance, De Martino et al., (2006) observed that framing effect was strictly linked to the activation of amygdala, suggesting that emotional system has a crucial role in mediating decision biases. This hypothesis is congruent with clinical studies on psychotherapy in bilinguals. Movahedi (1996) compared the psychotherapies conducted in native and foreign language. Even when the therapist was bilingual, patients showed a preference for the psychotherapy in their foreign language, since the use of it would prevent intense emotional reactions, allowing more rational and distant feelings.

A further evidence between native and foreign languages, this time from an introspective point of view, was reported by Bond & Lai (1986). In this study, native Chinese speakers discussed longer and easier about embarrassing topics in a foreign language (English), as compared to their native language.

Affective processing in bilingual speakers has also been investigated with neuroimaging techniques. Wu & Thierry (2012) found that positive and neutral words in a foreign language automatically activated their native language translation, contrarily to what happened with negative words. To do so, they used a translation priming task with native Chinese speakers proficient in English, who were required to say whether pairs of English words were related in meaning. While doing that, authors monitored their brain electrical activity. Participants did not know that some English words sounded a similar way as in Chinese. This phonological similarity facilitated positive and neutral words, such as “holiday” or “theory”, suggesting that Chinese words were automatically activated even when using English. On the contrary, analysis of the ERPs revealed that English words with a negative valence such as “violence” were not able to automatically activate the Chinese translation. In other words, while reading negative words in the foreign language fails to automatically activate the equivalent translations in the native language, reading positive and neutral words usually leads to languages coactivation.

In conclusion, these findings support the hypothesis that affective processing is less automatic and immediate in the foreign language, than in the native language.

Similarly, Harris et al. (2003) showed larger values of skin conductance when participants were auditorily presented with childhood reprimands (such as “shame on you” or “don’t do that”) in their native tongue (Turkish) as opposed to their foreign language (English), which was learned after the age of 12.

According to Bloom & Beckwith (1989) the reason why the first language is normally experienced as more emotional than the second one might be due to the fact that emotional regulation systems co-evolve with language. In other words, they suggested

that utterances learned earlier in life are likely to become tightly connected with the brain's emotional system.

However, Harris et al., (2004) reported that responses for English (L2) Taboo words were also noticeably high, which suggests that they can provoke an emotional arousal in both language conditions. In fact, although reprimands response confirmed what had been observed in Harris et al.'s. (2003) prior study, in which late learners of English, who had been exposed to English in the middle childhood while they were living in South America, manifested a higher reactivity to reprimands when formulated in their first language, that is Spanish, while early learners, who had grown up in the USA, showed similar responses to reprimands in both languages, this time both early and late bilinguals showed higher SCRs to Taboo words in English than in Spanish. This was interpreted as a consequence of socio-cultural aspects. First of all, they all live in contexts where English is the dominant language in daily life and reported greater proficiency in that.

Furthermore, participants claimed that colloquial Spanish normally involves Taboo words, which might be a further explanation of the small elicitation of SCRs within this language condition.

These results suggest that neither age of acquisition, nor proficiency, by themselves, are sufficient to distinguish languages from an emotional point of view and demonstrated how deeply linked are emotionality, socialization experiences and verbal conditioning.

In addition to these two factors, Dewaele (2004), then Caldwell-Harris et al. (2014) posited that emotional resonance might also depend on the context in which the language has been learnt. Thereby, when a language is learnt via immersion, the emotional resonance should be stronger than when it is learnt in an instructed context, such as the

classroom, which leads to the learning of “disembodied” language, used freely by speakers who do not experience its full impact.

In line with this consideration, Caldwell-Harris et al. (2012), in a questionnaire-based study on Russian speaking immigrants in U.S.A., found that age of arrival as well was a crucial factor and could significantly influence the frequency of first and second languages usage, the perception of the emotionality of the two languages, and the self-perception of both languages’ proficiency.

On the other hand, in the context of costumer research, in Puntoni et al. (2009)’s study results had revealed that slogans were rated as more emotional when framed in participant’s native language (French or Dutch) then when framed in their second language (English). This might depend on the fact that, according to the Episodic trace theories (Hintzman, 1986), frequently encountered words might be part of a larger number of episodic traces, thus they would entail stronger echo of emotions that have been experienced during all these events. In other words, the emotive impact of a word might be strictly correlated to its frequency. As a result, words could trigger stronger emotional responses in one’s native language rather than in their foreign one.

In conclusion, as the study showed, when making decision in emotional contexts, the language in which the message is framed can exert a great influence on one’s choice.

Along similar lines, Degner et al. (2011) argued that the frequency of use in daily life and language immersion jointly play an important role in emotional resonance: they found that bilinguals demonstrated significant automatic and emotional processing in a second language affective priming task, only when exposed to it and used it frequently.

This means that many components such as immersion, frequency and degree of a language use in daily life can engender strong emotional activation, even for a non-native language.

Like Keysar (2012), Costa et al. (2014) reported a FLe in a series of decision-making problems. In particular, they observed that decision making seemed to be sensitive to the language used, only in contexts that elicited heuristic biases grounded in emotional reactions. In fact, when they investigated to what extent decision making might be affected by the language used for the formulation, they found that in the Asian Disease problem students who performed in their native tongue showed a clear framing effect: when presented with the gain frame they tended to choose more often the safe option over the other, whereas they selected more frequently the riskier option when presented with the loss frame task.

Differently, those who performed in a foreign language chose both options almost indistinctly in the loss frame (albeit, like the other group, they chose more often the safe option than the risky one, with the gain frame). In other words, differently from the native condition, in the foreign language condition people did not show great difference in their responses, thus did not manifest a loss aversion bias.

The authors also found analogous results in the Discount problem (see Tversky & Kahneman, 1981), which assesses biases related to the psychological accounting of outcomes, in the Holt–Laury test (Holt & Laury, 2002), which assesses the risk-aversion attitude and finally in the Ellsberg’s paradox, which assesses the treatment of unknown probabilities that lead to ambiguity aversion.

Hence, in light of these results, they posited that the FLe would appear exclusively in problems that involve emotional components. In fact, when presenting people with

Cognitive Reflection Test² (CRT; Frederick, 2005), which has no emotional connotation and only needs a logical performance, poor performances were observed in both linguistic conditions, as common incorrect responses were given to the same extent, regardless of the language.

Since they did not observe a foreign language effect in logical thinking task or in tasks that did not involve emotional components (e.g., when they do not directly address the participant), they considered Keysar et al., (2012)'s emotional account a suitable explanation.

1.1.5.2. Cognitive accounts

According to a different perspective, the FLe might be due to cognitive factors, such as the timing of cognitive depletion and the nature of human memory (Hadjichristidis et al. 2017).

Cognitive depletion would be due to the fact that using a foreign language leads to increased memory load, particularly in the early phases of information processing, which, in turn, would reduce the capture of attention by tempting stimuli.

Further, since experiences and related emotions are coded in the language in which they occur, memories are more accessible when the same language is used at retrieval.

Consequently, all that has been learnt and experienced in a native language context, such as stereotypes and other mental constructs, may exert less influence when processed in a foreign language.

² The CRT test includes questions designed to elicit intuitive responses that need to be suppressed to provide the correct answer.

In line with the idea that experiences are encoded together with the linguistic context in which they occur, Marian et al. (2000) have previously demonstrated that when Russian native speakers, who had moved to the United States, were asked to recall specific life events, they retrieved more experiences from the Russian-speaking period of their lives, when they were interviewed in Russian, whereas they retrieved more experiences from the English-speaking period of their lives, when the interview was made in English.

Furthermore, in the wake of Hadjichristidis et al. (2017)'s account, Oganian et al. (2016) considered the switch among languages the real responsible for an enhancement of cognitive control, hence the main cause of a more analytic processing. In the first experiment, they used the Asian disease problem and found that the framing effect was present and consistent in both native and foreign language conditions and regardless of the proficiency level of the speaker: in the loss frame, the risky option was chosen more often than the safe one, and vice versa. Thus, this first experiment did not provide evidence for the existence of the FLe. Neither the number of foreign languages known by the participants seemed to modulate the framing effect: they found comparable magnitude of the framing effect in bilinguals, trilinguals and multilinguals. Therefore, these findings spoke against the “emotional distance account”.

Since they considered the experimental context responsible of the discrepancy between their results and previous studies, they replicated the experiment in a classroom and a laboratory setting. This time they introduced two further condition: the switch and the non-switch conditions. In the switch condition participants received instruction in a X language and performed the Asian disease problem in Y language. Contrarily, in the non-switch condition the same language was used. Similarly to the first experiment, they found a framing effect, this time significantly related with language switch condition: they

observed a main effect of frame only in the non-switch condition, while the frame effect almost disappeared in the switch-condition, both after a switch into a foreign language and after a switch into the native language.

This suggested that foreign language use per se had no effect on framing. The reduction of framing effects, might actually result from a change in the cognitive control level, like in situations requiring high cognitive control.

In line with the idea that language switching requires high executive functions, Scaltritti et al. (2015) compared a group of Italian-dialect speakers (i.e., bilinguals) with a group of Italian speakers (monolinguals) in a cognitive control task (i.e. *Flanker task*), in which participants were requested to indicate whether a central arrow, presented with other arrows pointing the same or different direction, pointed to the right or to the left.

Differently from what was observed in Costa et al. (2009) in which Spanish-Catalan bilinguals showed faster response times than monolinguals, the performances were similar for the two groups. In other words, they found no evidence of improved cognitive control in Italian-dialect speakers and they hypothesized that this might be due to the fewer occasions in which Italian-dialect bilinguals switch between the two languages with respect to Spanish-Catalan bilinguals.

In fact, as suggested by Costa (*ibid*), bilingual speakers in diglossic environments, that is, when two languages are used in different contexts (e.g. language X at work, and language Y at home), may not show advantages in executive functions. This is due to the fact that the non-target language is never activated in a given context, reducing in this way the need of monitoring and controlling the language in use.

Hence, if the opportunity of language switching represents a critical variable for observing language effects on executive control, such effects cannot be observed with Italian-dialect bilinguals, since most of the dialects in Italy are limited to informal contexts, while Italian is spoken in formal contexts as well.

Differently, Catalan-Spanish bilinguals use both codes in a wide range of contexts, thus their advantage might be considered as the result of their continuous monitoring the selection of one between two languages.

Another support for the linkage between bilinguals' advantages and language switching opportunities may be found in Lauchlan et al., (2012). In comparing English-Gaelic children -who were taught in both languages at school- with Sardinian children - who were exposed to an Italian programme at school but Sardinian at home-, they found advantages in executive control only for the first group of children.

Since Sardinian bilinguals use their dialect in fewer contexts compared to English-Gaelic bilinguals, these results might be interpreted as a lack of language-switching opportunities.

1.1.5.3. Access to social norms account

Another account of how language can modulate people's attitudes was given by Gawinkowska et al. (2013). In this study, bilingual participants translated ethnophaulisms (i.e., politically incorrect slur directed against social groups) more offensively from their native tongue to their foreign language, than vice versa. According to the authors, this does not mean that foreign language facilitates the use of swearwords because it can attenuate their emotionality, but rather it inhibits the activation of relevant social norms,

especially when the switch is into a more ‘politically correct language’³ than the source one. Thus, foreign language might attenuate and dampen moral and sociocultural norms, leading to different attitudes, which could also explain results observed in Bond and Lai’s (1986) study.

In line with this latter account, Geipel et al. (2015a) considered Foreign Language effect the result of a reduced activation of relevant moral and cultural norms in decision-making contexts. They assessed to what extent foreign language could influence moral judgement, by means of the trolley (Thomson, 1985) and the footbridge (Cushman et al., 2006) dilemmas, which propose to save a person by killing five.

Normally, people manifest consequentialist judgment, that is, they tend to accept to save five individuals by hitting a switch of the train which will cause the death of one person (e.g., trolley problem) but do not consider acceptable to save five individuals by pushing a man off a bridge (e.g., footbridge problem). This is probably due to the fact that the latter scenario involves personal force and instrumental use of a person, while the other does not. Since the footbridge dilemma triggers a strong emotional reaction, deontological responses are expected to manifest with this problem, whereas consequentialist responses are expected to appear with less emotion-grounded scenarios, such as the trolley problem.

What they observed in their study was that the use of a foreign language in the footbridge dilemma led to an increase of consequentialist responses, and this did not manifest with the trolley dilemma.

³ “[...] political correctness emanating from the Anglo-Saxon culture is definitely more rooted in English than in Polish.” Gawinkowska et al. (2013).

Previous accounts that claimed that this effect might be caused by a reduced emotionality are not supported by results here, since the authors found an attenuation of emotion in both dilemmas, when participants had to rate how they felt distressed about the scenario of each dilemma. Moreover, FLe was observed both in personal and in impersonal dilemmas. Thereby, they suggested that the only viable explanation for the FLe in this case was that the foreign language might have reduced access to social and moral knowledge. In other words, it could influence moral judgment in such contexts, by reducing the mental accessibility of social and moral rules.

Converging evidence of that derives from Geipel et al. (2015b), in which participants manifested less harsh moral evaluation of the violation of everyday social norms (e.g., cut in line when in hurry or sell someone a defective car), than when they had to do it in their native language.

One possible explanation of that, could rely on the fact that foreign language might limit access to relevant autobiographical memories. Since these latter had been considered to be language specific (thus, mostly encoded in native language), when language at retrieval and language of the encoding do not match, memories could be less accessible (Marian et al., 2000).

1.1.5.4. Difficulty and disfluency account

A different account for the FLe was given by Alter et al. (2007), who considered difficulty and disfluency the real causes of the phenomenon. In their view, when information is processed easily or fluently, the intuitive System 1 processes guide judgment. On the contrary, System 2 processes seem to be activated by metacognitive experiences of difficulty or disfluency during the process of reasoning.

Thereby, since foreign language processing occurs in a less automatically way than the native language (Favreau et al., 1983), the processing difficulty could entail analytic reasoning (Alter et al. 2007).

In other words, when information is processed with difficulty or disfluently, people become aware that an intuitive response is likely to be wrong, and this could lead them to a more elaborate (System 2) processing. Based on this, the typical reduced fluency of a foreign language would function as a signal: a simple and intuitive judgment might be insufficient: more elaborate cognitive processing would be necessary. This might eventually lead to more analytic decision-making processes.

In their experiments, they manipulated fluency across four domains of reasoning and observed that when participants experienced difficulty or disfluency, they started considering the task difficult and engaged a more analytical processing system.

Once participants perceived the difficulty, they felt lower confidence in the judgements and became more systematic in processing information.

This result is consistent with Simmons et al. (2006) study, where people appeared less likely to choose a default option when their confidence was weakened. The authors observed that the more individual intuitive confidence was reduced (by many contextual factors), the more people chose the nonintuitive option, reducing biased responses.

Neuroscientific studies reported neurological correlates of disfluency: across their research, disfluency triggered the anterior cingulate cortex (Boksman et al., 2005). This latter normally activates the prefrontal cortex, which has been found to be responsible for deliberative and effortful thought. Thereby, these results provide evidence for the fact that disfluency might prompt systematic processing.

1.1.5.5. Access to arithmetic account

Mello et al. (2017) investigated language effects on decisions, using a specific form of bilingualism: Italian and Venetian dialect. Venetian is a northern Italian dialect used preponderantly orally. Moreover, since Italian-Venetian bilinguals live in a bilingual environment, where they daily use both codes in different contexts, they show a similar proficiency in both codes.

Therefore, Venetian and any foreign language differ on several grounds. First, Venetian should be more closely associated to emotions with respect to foreign languages⁴. Second, Venetian is acquired in a natural context, at the same time as Italian, thus Venetian speakers are usually equally proficient in dialect and in Italian. This linguistic situation goes under the name of “balanced bilingualism”. Thus, Venetian differs from foreign language in terms of cognitive demand, frequency of use and switching opportunities.

Mello et al. (*ibid.*) examined the choice of Venetian-Italian bilinguals in the Asian disease problem. They found a consistent loss aversion bias in Italian but not in Venetian: while in Italian, the sure option was chosen more often when the problem was framed in terms of gains than losses, this tendency disappeared in Venetian, analogously to what had been previously observed with foreign languages.

A similar pattern was observed in the Discount problem (Tversky & Kahneman, 1981) in which people are presented with the purchase of a jacket and a calculator. While in one version of the problem the discount would apply to the cheaper item, in the other it would apply to the more expensive one. In both frames, participants are asked to decide

⁴ Pavlenko et al. (2012): In the processing of verbal stimuli, emotional responses may be triggered by: (a) referential content (denotation); (b) intentionality, i.e., speaker’s intended meaning (connotation); and (c) form, i.e., structural properties (e.g., accent, double negation). The third category also includes languages, dialects, and language varieties, as they too may function as emotion triggers.

if they would drive to another shop, 20 minutes away, where they could get the discount.

Albeit the gains are identical, thus should lead to similar decisions, people are normally more willing to accept the discount when it applies to the cheaper item (*ibid.*), manifesting a bias (accounting bias) in their choice. This tendency shows that people do not consider the global account (i.e., the prize of the two items), but myopically consider a partial information of the economic outcome (i.e., the item prize). Therefore, the frame in which the discount is offered for the cheaper item appears to be more appealing.

When using this task, Costa et al. (2014) showed that the accounting bias disappeared in the foreign language condition.

The same result was obtained in Mello et al. (2017): in the Italian formulation people showed a higher preference for the discount offered on the cheaper item, compared to the Venetian formulation.

In conclusion, these findings showed that a similar pattern occurred with foreign languages and Venetian. However, the effect obtained with Venetian is difficult to explain under emotion or cognitive accounts, given that Venetian and Italian bilinguals involved in that study were balanced bilinguals and therefore should not manifest asymmetries in emotion activation or cognitive load while processing either the two languages.

In order to better investigate the kind of computation involved in decisions made in Venetian, Mello et al. (*ibid.*) designed a variant of the original problem. They created three experimental conditions which differed among them either for the discount amount (e.g., 2€ or 5€), or for the price of the non-discount item. While two of these versions consisted of a 3% discount on the total amount, one consisted on an 8% discount on the total price. Results showed a significant difference between the 5€ and the 2€ discount conditions, but not when the discount amount was the same. Thus, the discount was not considered in relation to the global information (i.e., total cost) it applied to, but in

relation to local information (i.e., the item price).

Mello et al. (*ibid.*) hypothesized that this was due to a different sensibility to numeracy between the two languages. Although Venetian possesses its own number words and a dialectal version of arithmetic functions, arithmetic is acquired exclusively in Italian at school, thus the entire cognitive scaffolding of numeracy is laid down in Italian.

Therefore, since Italian is the only code used for the acquisition of numeracy, the automatic access to numerical information in this language might provide the condition for the bias to arise more easily.

On the other hand, in Venetian, information relative to numbers and arithmetic computations might be less available and have a different impact on decisions.

According to the Triple Code model, proposed by Dehaene and Cohen (1995), arithmetic facts (especially multiplication) are learned by rote and stored in memory, based on verbal associations. The retrieval of the result of a fact needs the transcoding of the numerical stimuli into the language in which arithmetic was first learned.

In a consistent body of studies, it has been observed that bilinguals performed better in simple arithmetic tasks when they used the language in which arithmetic was learned than in another language.

For example, Frenck-Mestre et al. (1993) engaged the associative confusion effect to investigate arithmetic-related associative processes in a study group on of late English-French bilinguals. They used an arithmetic verification task in which participants had to decide whether a given equation was true or false. The experimental manipulation was performed on the false responses. In one false condition the numbers of the equation were related among each other for a given operation but not for another operation. For example, 4, 3 and 12 can be arranged to form a true equation, $4 \times 3 = 12$ or to form a

false equation $4+3=12$. In another false condition the numbers of the equation were unrelated, e.g. 4, 3 and 9 (both $4+3=9$ and $4\times 3=9$ are false). The results showed longer response times for the first false condition than for the latter. The authors called this effect the “associative confusion effect”.

They showed that this effect was larger when stimuli appeared in digit format and in the native tongue format, than when it appeared in foreign languages. In fact, when foreign language was used, they found interference for numbers numerically close to the correct response (i.e., they chose “7” for the problem $3+5$), but not for associatively related numbers (i.e., they did not choose “12” for the problem $3+4$ in the foreign language condition). Thus, participants performed slower and less accurate in the second language condition and this suggested differences in language sensitivity to the access to the network of numerical facts.

Converging evidence for the hypothesis that the retrieval of stored arithmetic facts is language-sensitive has been provided by Spelke & Tsivkin (2001). Russian-English bilingual students were taught new numerical operation, new arithmetic equations, and finally new geographical or historical facts involving numerical or non-numerical information.

After having learned a set of items in both two languages, they were tested for knowledge of those items and new one in both languages. Across the experiments, participants retrieved information about exact numerosity (i.e., that has no uncertainty, such as “4”) faster in the language of training, both when the test concerned arithmetic facts and when it concerned other domains, as well as they solved trained problems (i.e., additions, cube roots estimate) more effectively than untrained problems. In contrast, they did not show differences, in terms of efficiency, between the two languages in the

retrieval of approximate numbers (i.e., approximated to the exact numbers, such as “ $\sqrt{10}$ ”) or non-numerical facts.

The authors interpreted their results arguing that while exact number representations are language-dependent, approximate numbers and non-numerical facts are not. Exact number facts learnt in one language are expected not to be immediately accessible in the other languages, while approximate numbers should be equally accessible, regardless of the language in which they have been learnt.

In this regard, Bernardo (2001) studied Filipino-English bilinguals, who had been trained in mathematics with English. Participants performed an arithmetic verification tasks where they had to verify equations presented either in digit, in verbal-Filipino, or in verbal-English formats.

The results showed that participants processed faster and more accurate verbal English items, than verbal Filipino items. Furthermore, with the verbal-English condition, participants were equally fast with digit and verbal-English probe (i.e., correct or incorrect sums presented), since both codes had been activated, compared to the verbal-Filipino items.

In conclusion, it seems that people are faster and more accurate in verifying arithmetic problems in the preferred language for arithmetic, which is not necessarily their first language, instead it is likely to be the language used for learning and practicing arithmetic.

These results are consistent with Vaid and Menon’s (2000) analysis of survey data, which investigated linguistic correlates of numerical tasks among Spanish-English bilinguals. What emerged from the questionnaire was that those who had received an

instruction in Spanish, who had learned English after eight, had been living in the USA for less than six years and considered themselves to be more proficient in Spanish than in English claimed to use Spanish in their mental arithmetic. Analysis demonstrated that the most significant variable among these latter was the language used in elementary school.

In line with the abovementioned studies, Mello et al (2017) accounted for their results by positing that, since Venetian is not used to learn arithmetic, Venetian-Italian bilinguals might have access to different types of information when they are asked to evaluate problems containing numerical information, hence showing different patterns of outcomes.

Analogously to Mello et al. (*ibid.*), the current research involved an Italian dialect, Osimano, thus it is mandatory to introduce it from both linguistic and sociolinguistic perspectives.

2. Sociolinguistic and dialectological premises

Before addressing the more specific issue of the current study, it is mandatory to clarify the sociolinguistic scenario of Italian dialects, as well as to present the main linguistic characteristics of Osimano dialect.

2.1. Brief historical and sociolinguistic overview

From a sociolinguistic point of view, Italy represents a rare sample of *dilalia*: the higher linguistic variant is allowed in every context, both formal and informal ones, while the lower one is exclusively allowed in informal and familiar contexts (Berruto, 1987). In the present case, Italian is the higher variant, whereas the regional dialects stand for the lower variants.

It is worth mentioning that dialects and the Italian standard are structurally separated from each other, which is quite infrequent in Europe today. As remarked in Auer (2005), in many areas in Italy, such as in Calabria, Lucania, Emilia-Romagna, or in Marche there are not regiolects, but highly diversified dialects which differ from these last, also in terms of use domain (Trumper et al., 1987)⁵.

Until the 19th century Tuscan, more exactly the Florentine dialect, was, in a sense, a vernacular just like the others; since the unification of the country states in 1861, which led to the formation of the Kingdom of Italy, because of the prestige gained by 14th-century local poets, and for other economic and political reasons, Tuscan became Italian,

⁵ As reported in Trumper et al. (1987), in Marche there is no tendency towards a dialect koine formation, thus dialects coexist as “microcircuits”.

thus the official language of the new country. As plainly expressed by Salvi (1996) “official languages are [...] originally only dialects that have been successful”.⁶

Differently from other European countries, where monarchy imposed a standard language, in Italy the creation of a national language was not forced, since there was not only one economic, political and cultural centre.

Until the first decades of the twentieth century, Italy has been living in a diglossic situation: Italian was exclusively used in its written form and in official documents by a reduced and privileged minority of the population. In the rest of the contexts, especially in the rural regions, dialect was the only language used. In other words, dialect was the first language.

Due to historical and social events which had a remarkable impact, such as the introduction of the television, the consistent geographical mobility, the urban development and the increase of literacy rate, Italian gradually spread and shifted from an elite and written variant towards the preponderant language of communication.

As a consequence of that, the use of Italian expanded to almost every context, leading to a dampened use of the dialect (Balducci 2000; ISTAT 2015). The adaptation of Italian to several contexts was at the expense of its integrity: since then, a consistent number of regional Italians arose, as the result of the combination of the normative language and local varieties. Indeed, Berruto (1989) described the Italian linguistic situation as a scenario in which dialects are likely to be levelled (koineization) and tend to convergence towards the standard language (italianization), while the normative Italian

⁶ Salvi S., (1996). *L'Italia non Esiste*. Firenze: Comunia. Original version: “le lingue ufficiali sono [...] all’origine soltanto dialetti che hanno avuto successo”.

gradually loses its standards (dialectalization) leading to the creation of a “more popular” and hybrid (hybridization) Italian.

Today Italian is the only native language taught through a formal education and it is used not simply in its written form but orally, as well. On the contrary, all the other varieties (or at least the majority of them⁷) are learned spontaneously, informally and only in their oral form.

As forecasted in Auer (2005)’s sociolinguistic model, diglossic repertoires can lead to dialect loss, across one of two following routes: in one case, the dialect gets lost because of the gradual infiltration of normative language’s features; in the other case, because of its use becoming sporadic, it vanishes little by little.

According to ISTAT (the warehouse of statistics currently produced by the Italian National Institute of Statistics) 2015 reports, the 45.9% of the Italian population use previously Italian at home, while the 32.2% use both Italian and dialect and only the 14.1% use exclusively dialect. The 12.1% use previously dialect with friends, because talking with friends often occurs in Italian (49.6%) even more when talking to stranger people (79.5%).

Among the central regions, only in Marche was reported a use of dialect at home (56.3%) which is higher than the national average. In the northern area, Trento (54.9%) and Veneto (62.3%) distinguish, as well, for the high involvement degree of dialect in informal contexts such as with family.

⁷ Friulan language, for instance, is taught at primary and secondary school since the promulgation of the 482/1999 Law, which recognized some linguistic minorities of Italy (<http://www.camera.it/parlam/leggi/99482l.htm>).

The reduction of the exclusive use of the dialect concerns every age group, even the oldest people: only the 32% of the over-75 years of age speak only or prevalently dialect, moreover, those who use exclusively dialect at home have low educational qualification.

The preferential use of Italian decreases with elder people: at home, in 6-24 years old people it is around 58.5%; with over-65 years of age is around 34.2%. Differences seem to be sensitive to the gender, as well: the 47.5% of women are likely to privilege Italian at home, while the 44.2% of male population do the same. Similarly, the 53.2% of female population privilege Italian with friends, while the 45.7% of men do it.

The exclusive or prevalent use of Italian for every context is more common in the north-western and in the central regions of Italy: while the 61.3% of north-western and the 60% of the central inhabitants speak Italian most of the time, only the 27.3% of southern and the 32.9% of islands inhabitants do it.

For what concerns formal contexts, at work the 77.5% of the national population use exclusively Italian, while the 15.8% use both languages. In north-western and central regions, the use of dialect at work is more common than elsewhere.

From a broad overview of these data, the scenario that immediately emerges shows that dialect use is limited to informal contexts and little by little it is dampening. In the last decades, the use of Italian in familiar contexts has significantly increased, whereas the use of dialect in the same contexts has noticeably been limited. Furthermore, the social groups which involve exclusively dialect in their informal interactions are low-educated or aged people.

As a consequence of that, today dialect is often likely to be identified as a synonymous of backwardness and subculture. Although this attitude seems to have been

softened, a real denigration had consistently stretched out over a long period during the Italian fascist government, which aimed for a national, thus linguistic, cohesion. Speaking one's own dialect meant being rough and became humiliating. At school there were penalties (sometimes even pecuniary ones) for those who used dialect, as this was considered a "corruption of originally perfect languages" (Renzi, 1977).

Inevitably, people tended to distance themselves from the vernacular which could compromise their own image.

Auer (2005) analyses how normally a diglossic situation leads to dialect loss and claims that when a dialect is not handed on to the next generation, it could be lost by shift. This can reflect sociocultural changes, such as the loss of prestige of a dialect, which inevitably results in a loss of domains of usage. In cases like this, what normally occurs is that parents avoid dialect with their children; a consequence of this might be that the average competence in that variety decreases, leading to insecurity and reluctance to speak dialect in more out-group contexts.

What has been observed is that normally, in the stage which anticipates loss, a new positive attitude towards the almost extinct dialect arises, and sometimes communities show attempts at rescuing the dialect, unfortunately without success (*ibid*).

Few years ago, a legislative proposal which aimed to involve regional dialects in educational programmes caused an intense debate: the purpose was to strengthen the relationship between school and local culture, as well as to gain a linguistic awareness of the two variants.

Nevertheless, it could not awaken any enthusiasm, since, aside from the problematic aspects of the proposal, the collective mind perceived it as “dangerous” and a “threat” to the integration of Italian.

On the other hand, in the last decades, several institutions and social movements have been showing a strong willingness to preserve and revalue dialects. These initiatives consist in dialect courses, different kinds of dialectal entertainment, the creation of a “dialect-day”, a flourishing production on dialectal vocabulary, a growing research on dialectal issues and the like.

Many linguists claimed that people from more recent generations seem to be more aware and sensitive about the importance of the Italian dialects. The fact that cinema along with music started again in incorporating dialects in their production, promoted the requalification and the acceptance of regional varieties. As mentioned in Grochowska (2015), Sanremo Festival, the national Italian music festival, in 2010 allowed dialectal songs to the participation of the competition, which had been banned until that time.

Therefore, the hostile attitude towards Italian dialects seems to be vanishing, especially among new generations, where a new awareness is increasing. However, as reported by ISTAT data, remnants of past stereotyped consideration of dialects persist.

It is worth concluding this sociolinguistic overview by mentioning the fact that, from a merely linguistic point of view, Italian and the rest of the dialects are undistinguishable: they all are complexed and functionally linguistic systems, provided with their own lexicon, phonology, syntax and prosody.

Moreover, differently from what is commonly believed, Italian dialects are not linguistic variants descending from Italian, but they are independent linguistic varieties which share, at least the majority⁸, a common origin with Italian: Latin.

Indeed, Italian dialects differ among each other, as much as German does from Dutch or Italian from French (Lepschy 1998). Thus, the intelligible criterion often applied between a language and a dialect, cannot be adopted here⁹.

In summary, Italian normative language and Italian dialects only differ from a political and sociolinguistic point of view. Furthermore, it has to be reiterated that what today is Italian, once used to be a dialect.

To summarize with a notorious metaphor: “A language is a dialect with an army and navy”¹⁰.

2.2. Osimano dialect

Osimano is classified as an Italian central dialect spoken in Osimo, a town located in Marche which has around 35,000 inhabitants. Marche, whose plural name is suitable for its whole identity, is characterised for an incredible dialectal variability due principally to historical and political reasons.

In fact, even if Marche has always belonged to the temporal power of the Church, its reality has always been fragmented by the presence of many duchies, earldom and

⁸ Many Italian dialects derive from different languages such as German, Slovenian, Albanian, Croatian and Greek. (www.atlantelinguistico.it).

⁹ In some European states like Germany or Spain, many languages which originally were considered “dialects” because of the same sociolinguistic aspects of Italian dialects have finally been recognised as regional languages. Since that time, they are protected under the provisions of the European Charter for Minority or Regional Languages. In Italy there are only few analogue cases, such as Friulian and Sardinian (Coluzzi 2007).

¹⁰ Quote from Max Weinreich. 5th January 1945, YIVO conference. Original Yiddish version: *a shprakh iz a dialekt mit an army un flot*.

bishoprics. Linguistically, this region has been (and continues being) conditioned by the closest regions, such as Umbria, Emilia-Romagna, Abruzzo, Toscana and Lazio.

In the last century, a lot of linguists attempted to formalize the dialectal distribution of this region and most of them concluded with a four-areas solution: a first northern Pesarese area, a central Anconetana area, a central Maceratese area and finally a southern Ascolana areas (Balducci 1977, 2000; Vignuzzi 1988).

Osimano is one of the central-Anconetana area and it is 20 km far from Ancona, the edge of the Rome-Ancona isogloss which, according to Rohlfs (1937) is likely to separate Italian northern dialects from southern¹¹. According to a further partition, Osimano belongs to the Osimana-Lauretana sub-area, whose characterizing features is the identical verbal form of 3rd singular and 3rd plural person and the syntactic doubling.

Its localization seems to be crucial for its dialect, which reflects typical northern dialects' features, as well as many of the southern ones.

The divergencies as well as the similarities between Osimano and normative Italian manifest in any linguistic domain. It is necessary thus to premise that in the following review, when comparing the standard form with the dialectal one, it is not meant that this latter version has passed through the normative form, because, as already mentioned, Italian dialects directly evolved from Latin. The aim of the juxtaposition is to facilitate the comparison between them and to better understand the meaning of the Osimano structure.

¹¹ Actually, more recently, Loporcaro (2009) suggested new coordinates of the linguistic isogloss, whose southern edge would be set in Senigallia, thus further north.

Thereby, the two variants have to be considered as different paths starting from the same source (Latin). On the contrary, when the Latin source is reported, the mean is to show the gradual transformation.

In the following presentation all the examples are taken from Cintioli (2015), when not specified otherwise. ¹²

From a phonetic and phonological point of view the main divergent features are:

a) for what concerns the tonic vowel system (*ibid.*)

-high vowels are lowered: /i – u/ > [ɪ – ʊ]

-mid vowels incur a light semivocalization, which is palatal when there is a front vowel, and is velar when the vowel is a back one; the semivowel moreover precedes open-mid vowels and succeeds close-mid ones /e – o/ > [e^j – o^w], /ɛ – ɔ/ > [ɛ^j – ɔ^w]

(1) [ˈp^wɔssi ˈðillu veraˈmiente]

can_{2PS} say-cl.obj really

“You can say that again”

b) vowel apheresis when it is in initial position and it is followed by consonant cluster

(2) [anˈdato] gone: [ˈndaðo]; [ammaˈtsato] killed: [mmaˈtsaðo]

c) sonorization and spirantivation of voiceless stop consonants /t-p-k/ when intervocalic and spirantivation of voiced stop consonants /d-b-g/ in the same context¹³

(3) [faˈtika] labour: [faˈðiya]; [dˈito] finger: [ˈdɛðo];

[laˈbɛstja] the beast: [laˈβɛstja]; [ˈkapra] goat: [ˈkaβra];

¹² In his study Cintioli (2015) collected a consistent body of authentic and spontaneous Osimano productions, reporting the susceptibility of many dialectal structures to geographic areas.

¹³ According to Cintioli (*ibid.*), /k/ actually is likely to become fricative also in a beginning position and followed by vowels (e.g., CARBÖNEM > ‘carbone’ [garˈbo]).

[la'kapra] the goat: [la'ɣaβra]

d) lenition of /λλ/ followed by /i/

(4) [fa'mia]: [famiλλa]

e) degemination of intervocalic /r/

(5) ['guɛrra] war: ['guɛra]; ['tɛrra] ground: ['tɛra]

f) sporadic cases of intervocalic nasal assimilation, typical of southern dialects but almost lost in central areas (Balducci 2000; Loporcaro 2009)

(6) ['pjandzere] to cry: ['pjannɛ]; [Kwando] when: ['kwanno];

[ko'manda] rules_{3PS}: [ku'manna]

[dʒiovambattista], Giovambattista [gwamma'ti]

g) non-diphthongization of Latin tonic Ō, differently from what occurs with standard Italian: /wɔ/< Ō (Cintioli, 2015; Rohlfs, 1966)

(7) ['bɔ:~no ~ 'bɔ:ni] 'buono ~ buoni' < BŌNU

h) sporadic cases of non-diphthongization of Latin tonic Ĕ, differently from what occurs with standard Italian: /jɛ/ < Ĕ

(8) ['mɛ:ðe] (mietere) 'reap' < MĔTĔRE

i) sporadic cases of metaphony in tonic syllable, probably remnant of the 16th century, which are likely to be considered lexicalized forms (*ibid.*)

(9) a. ['pu:jo ~ 'pu:ji] (pollo ~ polli) 'chicken ~ chickens' <

PŪLLUM

b. ['ku:re] (correre) 'to run' < CŪRRĔRE

c. ['gummiðo] (gomito) 'elbow' < CŪBĪTUM

j) reduction of /je/ in /i/, in tonic syllable

(10) ['pi:no] full; ['ski:na] back

k) absence of Tuscan anaphonesis. While in standard Italian a coda element, in a tonic syllable, such as velar nasal [ŋ] or a palatal nasal such as [ɲ] had led to the raising of high-mid vowels (Sampson 1999), in Osimano this has not occurred

(11) a. ['leŋgwa] (lingua) 'tongue' < LĪNGUAM

b. ['oŋne] (unghie) 'nails' < ŪNGŪLAE

l) conservation of protonic /e/ in word context. While in Tuscan protonic /e/ (< Ī, Ē, Ĕ) underwent a closing in syntactic protonic contexts (e.g., /di 'nɔtte/ < DE NŌCTE) (Rohlf, 1966), in Osimano this happens only in word protonic contexts (Cintioli, 2015)

(12) a. [dʒe'nɔccjo] (ginocchio) 'knee' < GENŪC(Ū)LUM

b. [ne'po:ðe] (nipote) 'nephew' < NEPŌTEM

However, when atonic /e/ is followed by both tonic and atonic /i/, the approximant palatal /j/, or a nasal palatal /ɲ/ there might have a closing.

(13) a. [la'pri:ma sitti'ma:na] the first week

b. [tʃi'jɛ:ni 'te]

there come_{2PS} you?

“do you come?”

m) closing of atonic /o/ (< Ō, Ő, Ū) in [u] or even [ʊ] when in final syllable

According to Balducci (2000), this case must not be confused with Maceratese dialect, where -/u/ is well spelled out and easily identifiable, since it simply stands for a

prosecution of Latin -U. In Osimano, as well as in other neighbouring dialects, this evolution concerns Latin words ending in both -U and -O (e.g., ['iø] 'io', I < EGO).

- (14) a. [ku'nillo] (coniglio) 'rabbit' < CŪNĪCŪLUM
b. [mu'nello] (bambino) 'kid'_{MS} < MONĒD(Ū)LAM
c. ['di:yu] (dico) '(I) say' < DICO

n) intervocalic /v/ (both original, both derived from B) deletion

- (15) a. [ka'allo] (cavallo) 'horse' < CABALLUM
b. [kat'tio] (cattivo) 'mean'_{MS} < CAPTĪVU

o) gemination in post-tonic position (Rohlf's, 1966), especially for /b/, /m/, /f/, /n/ and /l/

- (16) a. ['subbiðo] (subito) 'immediately' < SUBĪTO
b. ['mɔnniɣa] (monaca) 'nun' < MONĀCHA

p) non-affrication of Latin C-G+E, I, which respectively became [tʃ] and [dʒ] in standard Italian

- (17) a. ['pa:ʃe] (pace) 'peace' < PACEM
b. ['pa:ʒena] (pagina) 'page' < PAGĪNAM

q) apocope of /n/+voc in paroxytone words (Balducci 2000)

- (18) ['ma] hand; [ga'tti] kitties

r) palatalization of /s-z/ when followed by stop consonants /p-t-k-b-d-g/

- (19) ['moʃka] fly

s) syntactic doubling, typical of the Osimana-Lauretana sub-area (Balducci 1987, 2000; Cintioli 2015; Mancarella 1970)

- (20) a. [vjɛ k'kwa] come_{2PS} over!
 b. ['sɔ dda per 'me] (I) am by myself

Compared with northern varieties, Osimano, and in general Central-dialects, show a high intelligibility with standard Italian, from both morphological and syntactic point of view. Nevertheless, there are some features which are worth being mentioned¹⁴.

a) the 3rd plural person form is usually replaced by 3rd singular form, which is typical of the Adriatic shore (Rohlf's, 1968)

- (21) a. il fiolo gioga, the kid plays
 b. i fioli gioga, the kids play

b) the 3rd plural person is also provided with a -ne as morphological suffix

- (22) a. I fioli giogane, the kids play
 b. tutti polene, everyone can

c) the 1st plural person conjunction in simple present does not show the Tuscan generalized -iamo suffix, but -mo suffix preceded by the thematic vowel

- (23) a. giogamo, (we) play
 b. bevemo, (we) drink

d) sporadic cases of metaplasm in morphologic suffixes, compared to standard Italian and original Latin (Cintioli 2015)

- (24) a. ['fjo:ro] (fiore) 'flower' < FLŌREM

¹⁴ A phenomenon which apparently has never been mentioned before by any dialectological study is the postposition of 'because' adverb in causative phrases (e.g., in explaining why one is not hungry anymore they might say "ho già magnado perché", 'have_{1PS} already eaten because', 'Because I have already eaten.') Although this structure needs more attention in detailed studies, we considered it was worth to report it here in a mere speculative way, since it has been empirically remarked a consistent number of times, along the data collection of the current study.

b. [at'tente] (attento) 'careful'_{MS} < ATTĒNTUM

e) possessive adjectives normally are postponed and sometimes can show a female singular form even when referring to male and plural entities

(25) a. [l'amifi mia] (the) my_{FS} friends_{SMP}

b. [el'gattu mia] (the) my_{FS} cat_{MS}

With kinship terms, the possessive adjective normally is preponed or show an enclitic form.

(26) a. [tu'maðre]=[ma'mmeða]

your_{2PS} mother = morthier-your_{2PS}

“your mother”

b. [mi'ttsia] my aunt

c. [la'ttsiza]

the aunt-her/his

“her/his aunt”

f) demonstrative pronouns [kwesto], [kwesso], [kwello] are reduced respectively in [sto], [so] and [kul] when used as adjectives

g) first plural person in past imperfect tense of 'andare' (to go), 'dare' (to give), 'stare' (to stay) seem to be analogies of 'dire' (to say) and 'fare' (to say) past imperfect forms

(27) a. [fa'jeo] (I) was doing

b. [nda'jeo] (I) was going

c. [sta'jeo] (I) was staying

h) first singular person in past imperfect tense show the peculiar suffix *-mje*¹⁵, which Rohlfs (1968) compared to some southern Roman variants

(28) [fa'ʃemje] (we) were doing

i) presence of /sa/ (with) preposition, typical of northern-central area, alternated with /ko/ (<CŮM)

j) presence of /lia/ personal pronoun, instead of neo-standard Italian /lei/

k) replacement of past simple tense by present perfect

(29) [è ndaðo] (he/she) has gone

l) intransitive verbs such as 'piacere' (to like) are realised in their perfect forms with the auxiliary 'avere' (to have) instead of 'essere' (to be)

(30) m'ha piaciuto

cl.refl.(to me) has liked

"I have liked it"

This quick overview attempts to show with clear examples, the linguistic incompatibility, under many perspectives, between Italian and this idiom. It is necessary to point out that, since the aim of this section is to make a brief presentation of Osimano dialect before moving on the main study, many diachronic and synchronic aspects are overlooked.

For example, even if the abovementioned characteristics have not been presented in relation to the neighbouring linguistic varieties, they actually manifest an existing

¹⁵ Actually, in Cintioli (2015) two more different forms were remarked: *-/mmi/* and *-/mmise/*, which are limited to rural areas.

continuum in the Italian dialectal scenario, where the inter-comprehensibility among dialects gradually decreases according to geographical distance.

Furthermore, although some features have been presented as regular in their occurrence, they actually change from district to district, within the same geographical area. For further in-depth analysis about the relationship between Osimo's dialect and its geography, consult Cintioli (2015).

Moreover, this presentation has to be considered as a sort of “freeze-frame” of Osimano, since this dialect shows a great dynamicity and liveliness, in term of evolution: the age of speakers seems to be a crucial variable, since Osimano has significantly changed across generations¹⁶.

¹⁶ For that, and for cognitive and legal reasons as well, only 18-70 years old people were involved in the current research.

3. The present study

3.1. Aim of the study and predictions

The current study aimed to assess whether results found in Mello et al. (2017) might be generalized to other Italian dialects, throwing some light on the nature of the language effect. To address this issue, the present research involved Italian-Osimano bilinguals, who had acquired both linguistic systems in early age and use both codes daily, in different social contexts (see chapter 2.1).

Many tasks were selected in order to better investigate whether numeracy might actually have played a prominent role in the language effect found in Mello et al. (*ibid.*)'s study, whereas others were chosen in order to replicate previous experiments.

(a) The Asian disease problem (Tversky & Kahneman, 1981) was used in the current study in order to make a direct comparison with results obtained with Italian-Venetian speakers and see whether Osimano could be compared to Venetian. The standard formulation is presented in chapter 1.1.5.

The problem examines people's loss aversion in two identical but framed situations.

It requires to select one between two medicines in order to face the propagation of a mortal disease: a safe one with sure return (i.e., Medicine A) or a riskier one with uncertain return (i.e., Medicine B). Despite providing the same information, the problem might be presented according to two different frames: a gain frame, which describes the situation in terms of saved lives, and a loss frame, which describes the situation in terms of dead people. For example, in the gain frame the Medicine A consists of a cure for 1/3 of the population, while it leads to the death of the 2/3 of the population in the loss frame.

Typically, the Medicine B option is chosen more often when the problem is formulated according to the loss frame, and this goes under the name of *Loss aversion bias* (Levin et al., 1998; Tversky & Kahneman, 1981).

Since this bias was considerably reduced when formulated in Venetian (Mello et al., 2017), analogously to what had been observed with foreign languages (Keysar et al., 2012), similar results were expected in the present research.

(b) In order to directly assess the role played by language on numerical abilities, the experiment engaged a Basic Arithmetic problem, a test designed by Schwartz et al. (1997), which Lipkus et al. (2001) had adapted to a health risk context, in order to investigate how highly educated individuals perceive numerical expressions concerning risks, such as probabilities, percentages, and frequencies. It requires to do a simple multiplication (e.g., $2 \times 1\%$ or 2×1) after having been presented with a problem formulated in terms of percentage, or in terms of proportion. After having been presented with a first person's risk of getting a disease (i.e., 1% or 1/100 in ten years), participants had to answer which was the risk for a second person of getting a disease, knowing that it was the double of the first's person. The test was one of the expanded numeracy items which received the higher number of correct responses in previous studies, especially in its percentage formulation.

Furthermore, in assessing to what extent numeracy was related to decision problems concerning the retrieval and use of numerical principles, Peters et al., (2007) used the same items involved in Lipkus et al. (2001) and, one more time, this problem appeared to be one of the more successful, especially with the percentage frame. This made them posit that, differently from higher numerate individuals, less numerate people are more

influenced by the affective imagery elicited by the frequency format, whereas they cannot have access to this affective imagery when given the percentage format.

This test was involved in the current study, to tests whether the ability to answer to this problem varies according to the language used.

Since Mello et al. (2017) considered numeracy responsible for the differences observed between Italian and Venetian performances, the current test was expected to show a language effect.

(c) The effect of language on numeracy was further tested indirectly through the Bowls problem (Denes-Raj et al., 1994), originally designed by Miller et al. (1989).

In this study participants had to decide in which between two bowls containing a different percentage of red balls they would draw, considering that they would win 5 euros, in case they drew a red ball. One bowl contained a total of 100 balls and the other a total of 10 balls. The number of red balls contained in each bowl was expressed either in terms of percentage (i.e., 9% vs 10%) or in terms of proportion (i.e., 9/100 vs 1/10), according to the format frame the participant was associated to.

In the original version, instead, participants were presented with the following situations: they had to imagine that they had bought a package including both chocolate and oatmeal chip cookies and that their child, who loved chocolate chips cookies, only ate the chocolate one, leaving the oatmeal ones to go stale. To cope with the situation, (they had to imagine that) they had asked their child to close his eyes before reaching into the jar, containing 1 (or 10) chocolate cookie(s) and 19 (or 190) oatmeal cookies, taking whichever cookie he grabbed. He had agreed and shortly had come back with a chocolate cookie, saying that he had done like he had been ordered to do. Participants were then

asked to say, on a 9-point scale, how suspicious they would be that the child peeked into the jar before selecting the cookie.

Although the two scenarios showed the identical probability of selecting a chocolate chip cookie (1/20 vs 10/200), they expressed grater suspicious with the scenario involving only one chocolate cookie chip. In other words, their predisposition to accept the event as a coincidence appeared to depend on the absolute number of ways in which the event could have occurred.

These findings were interpreted as a proof of the fact that subjective probability estimates tend to be influenced by the absolute number instances in addition to the proportion of instances. Thus, “the more easily can imagine or mentally simulate something happening by one route (chance), the less suspicious they are that it occurred by some other route (peeking)”.

As clearly summarized by Kirkpatrick and Epstein (1992) when referring to Miller et al. (1989), “the readiness with which alternatives can be imagined determines the ‘normality’¹⁷ of an event”. For that reason, the scenario in which one chocolate cookie was drawn from the 20 cookies jar was perceived as more abnormal, therefore it arose grater suspicious. This would show how events are evaluated according to the representation that they bring to mind. Kirkpatrick and Epstein (*ibid.*) involved Miller et al. (1989)’s Cookies-jar experiment and observed that when subjects were given the opportunity to win money by drawing a red jelly bean from two bowls containing 1 red of 10 beans and 10 red of 100 beans, despite being aware that both bowls contained the 10% of red beans, over two thirds of them decided to draw from the bowl containing

¹⁷ According to Kahneman and Miller (1986) an event can be considered “abnormal” when it shows highly available alternatives, whether retrieved or constructed. Differently, they considered a “normal” event, one that mainly evokes representations that resemble it.

the larger number of beans. Moreover, they reported that, although they knew that their behaviour was irrational, they felt that one bowl offered a better chance of winning.

This was considered as a confirmation of the ratio-bias phenomenon and was interpreted as an evidence for the existence of a non-rational mode of processing information, which is independent from the rational one.

In line with these studies, in Denes-Raj et al. (1994), participants were asked to draw from one among two transparent bowls containing red and white jelly beans. The bowls were arranged in pairs consisting of a large bowl, containing 100 beans of which between 5 to 9, depending on the trial, were red; and a small bowl, which contained 10 beans, one of which was red. Thus, while the small bowl offered a 10% of chance of drawing a red bean, in the large bowl the probabilities of drawing a red bean were between 5% and 9%.

Each bowl was clearly labelled with an index card indicating the percentage of red jelly beans contained in it. They would win 1\$ for every red jelly bean drawn and they would win nothing if they drew a white one. The experiment involved photocopies of dollar bills which were exchanged, at the end, with real money. What they observed was that participants frequently decided to draw from the bowl containing a greater absolute number, but a smaller proportion, of red beans. In other words, people tend to be more influenced by absolute numbers rather than ratios information. In this case as well, findings were interpreted as a proof of the existence of two modes of processing information (as supported by cognitive experiential self-theory, CEST): one identified as intuitive-experiential mode which is more sensitive to absolute numbers than to ratios, and one identified as analytical-rational mode which is likely to work in a deliberative and logical way. In case of conflict between them, most of the time people tend to behave according to the intuitive route, despite being aware of the irrationality of their behaviour.

Moreover, they reported that albeit the experiential system is normally adaptive in natural situations, it is often maladaptive in unnatural situations that require logical analysis and an understanding of abstract relations, since it becomes a source of biases.

For instance, it has been shown that individuals often ignore basic statistical concepts and rely instead on judgemental heuristics based on representativeness, availability, anchoring effect and salience (Fiske & Taylor, 1991; Kahneman, Slovic, & Tversky, 1982). The selection of a system rather than another is considered to depend on the nature of the situation and on the degree of emotional involvement. Thereby, when a situation requires a high emotional degree involvement, people are more likely to engage the experiential system.

Peters et al. (2006) used a slightly modified version of the original bowl-problem and found that suboptimal choices (i.e., 9% or 9/100 bowls) were correlated numeracy level: people with lower numeracy abilities tended to choose more often the bowl containing 9/100 red balls than people with high numerical abilities.

According to the hypothesis put forward by Mello et al. (2017) about lower numeracy abilities in Venetian with respect to Italian, the current task was expected to show a correlation between nonoptimal choices and Osimano performances.

(d) Finally, the Ticket-Money Loss problem (Tversky and Kahneman, 1981) was used as a control task. This task investigates how people consider economically identical situations that differ in psychological accounting of outcomes. The problem was formulated according two different frames: a ticket loss frame and a money loss frame.

In the ticket-loss version, a woman has bought two tickets for a play and has lost them. In the money-loss version, instead, the woman has lost the money to buy the tickets

for the play. In both versions, participants had to evaluate whether, in their opinion, the woman would (re-/) buy the tickets. Typically, participants are less likely to say the woman would buy the tickets in the ticket-loss version than in the money-loss version.

This result has been interpreted as due to the fact that, while in the money-loss version the loss is not directly linked to the ticket purchase, in the ticket-loss version the loss is considered as a part of the same economic decision (Tversky and Kahneman, 1981).

In fact, as specified by Tversky & Kahneman (*ibid.*), the two formulations, which are identical in global accounting, only diverge in their psychological account: in the ticket loss version the purchase of a new ticket entered the account that was set up for the original ticket; in other words, the lost 10\$ ticket is considered as a part of the same economic decision, thus this would lead to perceive that the final expense as doubled and, thus, not convenient. Contrarily, in the money loss version, the loss of 10\$ is not directly linked to the ticket purchase, thus the lost 10\$ bill is not considered as a part of the same economic decision and the expense of the ticket would be perceived as 10\$. In that case, the sunk cost should not affect economic choice.

According to a prospect theory explanation, when the ticket is not yet bought, buying it is not seen as a loss; instead, when the ticket has already been bought, buying another one is perceived as a loss (Jullien, 2016). This task showed that frames can evoke different mental accounts, on which the significance of the loss depends (Kahneman, 2011).

Costa (2014)'s study involved the Ticket-Money Loss task and replicated the same findings by showing a framing effect, but with no relation with the languages involved: in other words, the same pattern was observed in both linguistic versions, indistinctly. They argued that this could be due to the reduced the emotional involvement, since it

described a situation that involved a third person and did not directly address the participant. Thereby, according to their emotional account, this could have reduced the foreign language effect.

According to the hypothesis put forward by Mello et al. (2017), the bias observed in the Ticket-Money Loss problem is due to the subjective interpretation of the outcome in terms loss and it does not directly engage numeracy, no language effects were expected.

As language effects on decisions have been originally found using foreign languages that have been learnt late in life and in formal contexts (see chapter 1.1.5), it is relevant here to highlight the differences between Osimano and foreign languages.

Indeed, Osimano performances should not be expected to replicate foreign languages' results, for a series of reasons.

One relevant difference between a foreign language and Osimano is age and modality of acquisition. Foreign languages are learnt after the acquisition of the first language, in formal context (i.e., at school), hence after the childhood language development period. Osimano is acquired simultaneously with Italian, in early age.

Furthermore, while the foreign language use is infrequent and usually restricted to specific occasions, in the case of Osimano, speakers live in a bilingual environment, where the two languages co-exist in a dilalic context. These differences affect the way in which language effects observed on decision in Osimano (and in Venetian) with respect to Italian can be explained. Indeed, since Italian and Osimano are both early acquired and highly used, they are not expected to differ cognitively nor emotionally (Harris et al., 2006).

This expectation is based on many studies showing that that emotional regulation systems co-evolve with language and the second language is considered less “emotional” only if acquired later on than the first one (Bloom & Beckwith, 1989).

Furthermore, no emotional differences between languages have been reported when the two codes are acquired via immersion and used in natural contexts (Dawaele et al., 2004).

In these conditions, the codification of experiences and related emotions occurred in both languages, which means that Italian and Osimano should not even differ in memory access, thus stereotypes and any other mental constructs would exert the same influence in both languages (Hadjichristidis et al., 2017; Marian et al., 2000). Actually, as Osimano was reported to be the preferred language when speaking in family and with friends (see 3.1 chapter), it could be eventually expected to show a greater emotional resonance in memory retrieval.

Finally, differences in emotional resonance could not derive from frequency use given that both Osimano and Italian are daily used (Degner et al., 2011).

Nevertheless, Mello et al., (2017) found analogies between foreign language and Venetian dialect conditions, as they both manifested a reduction of biased responses. The authors posited that a different availability of numerical information might be responsible for the language effect they found.

This hypothesis is based on the consideration that Italian is the (only) language used in arithmetic acquisition, and therefore decisions concerning arithmetic tasks might be expected to show diverging outcomes according to the language used.

The principal aim of this study was to further explore this hypothesis.

A secondary- but relevant - aim of the present study was to analyse the correlation between subjective and objective proficiency ratings in Osimano.

Two measures of proficiency were collected. During the experimental session, participants self-evaluated their comprehension and oral production competence in Osimano, using a 10-point scale. Using a 5-point scale, proficient native speakers evaluated participants' recorded speech of the duration of about 30 sec, in which participants talk in Osimano about many topics.

This aim has both theoretical and empirical outcomes. From a theoretical point of view, it might be interesting to investigate the metacognition about dialect use and proficiency. As mentioned in 2.1 chapter, although in Italy the hostile attitude towards dialects seems to be dampening, especially among new generations, a past stereotyped consideration of dialects is still present. From an empirical point of view the comparison between these two measures of proficiency might give indications about the possibility to compare this study with previous studies that mainly used self-evaluation questionnaires to select the sample of participants (Mello et al. 2017).

3.2. General methods

3.2.1. Participants

200 participants (mean age: 36.6 years; age range 18-70 years; 122 females) underwent all the experiments¹⁸ and were tested individually. They were recruited in person, most of the time in informal contexts and they did not receive any monetary reimbursement but participated out of interest. They were all native speakers of Osimano¹⁹.

¹⁸ For this reason, participants will be presented and described once and for all in this section.

¹⁹ Albeit eight of them declared they grew up speaking also another language (apart from Italian and Osimano) at home, they spent their childhood in Italy and received an education in Italian.

Out of the initial 200 participants who completed the experiment, 11 were excluded because were not rated sufficiently proficient in Osimano, thus only 189 were considered in the data analysis of the current study (mean age: 36.8; age range 18-70 years; 115 females). Participants' proficiency was evaluated by two native speakers who had to listen to participants' oral performance recorded throughout the experimental session (see 3.2.2 chapter). In the final part of the session participants were asked to evaluate their own Osimano proficiency on a 10-point scale, both from a comprehension and an oral production point of view (Table 1 displays responses distribution). The mean proficiency score was 8.54 out of 10 on their comprehension skills and 7.54 on their oral production skills. Not only the older participants, but younger people as well estimated a high (8-10) proficiency level of Osimano.

Table 1. Proficiency ratings on comprehension and oral production.

Proficiency ratings: comprehension	Participants	Proficiency ratings: oral production	Participants
3	0.5%	1	0.5%
5	2%	3	2%
6	5%	4	2%
7	12.5%	5	7%
8	28%	6	11%
9	18%	7	22.5%
10	34%	8	28.5%
		9	11%
		10	15.5%

The questionnaire on proficiency also included some questions about the use of Osimano in several contexts. On average, they rated that conversation in the family was predominantly conducted in Osimano (67.61%) and, similarly, talking with friends most of the time occurs in dialect (70.42%).

For what concerns more formal contexts, they reported to use this tongue 28.67% of the time at work, thus noticeably less than familiar contexts, and 51.05% of the time in the town, where conversations might involve unknown people.

The 71% of the total participants reported to have been exposed to this dialect in their childhood, since it is was spoken in the family, whereas the 29% of them declared they were not.

These data are definitely in line with ISTAT (2015) report, which considered Marche the only region with the use of dialect at home higher than the national average (See 2.1 chapter).

What evidently emerges from a broad overview of these results is that people tend to show a preferential use of Osimano in informal contexts, rather than in informal ones, albeit the employment of this dialect at work goes beyond the standard (ISTAT, 2015).

3.2.2. Materials

Materials, originally written in English, were translated by proficient speakers into both Italian and Osimano. To verify the correctness of the dialectal translation, this latter version was back-translated into Italian by other Osimano native speakers. Even if speakers were requested to translate the texts in a faithful way, sometimes they had necessarily to abandon the original structure, since Osimano could not always provide an equivalent translation.

The final versions of the two languages showed summarily the same number of words. Appendix section reports the translations (into Italian and into Osimano) of the original texts, used in the current study. Along the text, slashes were reported in order to indicate the end of a slide in the PowerPoint presentation.

Since Osimano is mainly a spoken dialect, learnt and used exclusively orally, problems could not be presented in their written form but only acoustically.

Texts in both languages were recorded by two male speakers: the Italian version was recorded by a 24-years-old Northern Italian speaker, whereas the dialectal version was recorded by a 26-years-old Osimano speaker. The duration of the audio recordings was approximately identical in the two versions. Although the Osimano version was often a bit longer than the Italian one, as the Osimano translation of some words sometimes consist of circumlocutions, the oral versions were almost identical, since Osimano oral productions are normally more speeded than Italian.

Audio recordings were inserted in PowerPoint presentations which only showed critical numerical details of the problem (thus, in the digit format). PowerPoint slides and acoustic descriptions appeared together and synchronically, and their duration was approximately the same in both linguistic formulations (see Appendix E).

For the Asian disease problem, the following text was used (see Appendix A for Osimano and Italian translations):

Gain frame: Recently, a dangerous new disease has been going around. Without medicine, 600 people will die from it. In order to save these people, two types of medicine are being made. If you choose Medicine A, 200 people will be saved.

If you choose Medicine B, there is a 33.3% chance that 600 people will be saved and a 66.6% chance that no one will be saved. Which medicine do you choose?

Loss frame: Recently, a dangerous new disease has been going around. Without medicine, 600 people will die from it. In order to save these people, two types of medicine are being made. If you choose Medicine A, 400 people will die.

If you choose Medicine B, there is a 33.3% chance that nobody will die, and a 66.6% that 600 people will die. Which medicine do you choose?

The first slide of the Asian disease PowerPoint presentation showed a picture of a virus. Then, according to the version the participant was assigned to, numerical information was reported, so that the last slide displayed a summary of the two options.

For what concerns the Basic Arithmetic test, Lipkus et al., (2001) versions were engaged (see Appendix B for Osimano and Italian translations):

Percentage frame: If Person A's risk of getting a disease is 1% in ten years, and person B's risk is double that of A's, what is B's risk?

I am going to repeat it again: person B's risk is double that of A's, what is B's risk?

Frequency frame: If Person A's chance of getting a disease is 1 in 100 in ten years, and person B's risk is double that of A's, what is B's risk? I am going to repeat it again: person B's risk is double that of A's, what is B's risk?

The first slide of the PowerPoint presentation showed a picture of a man (identified with Person A), labelled with a tag indicating the risk of getting a disease, according to the numerical frame (percentage or proportion), while the last slide also displayed the figure of the second man (identified with Person B), with a question mark under this latter. Thus, before making their choice, participants were presented with the two figures.

In the Bowls problem task, Italian and Osimano versions were designed according to Peters et al., (2007)'s paradigm (see Appendix C for the two translations):

Participants were shown two drawings of bowls of colored and white jelly beans and told to imagine that they could select 1 bean, and if they selected a colored jelly bean, they would win €5. The larger bowl, A, contained 100 jelly beans, 9 of which were colored, and was labelled as having "9% of colored jelly beans"; the smaller bowl, B, contained 10 jelly beans, 1 of which was colored, and was labelled as having "10% or colored jelly beans." Participants were asked from which bowl they would prefer to choose.

Thereby, the first slide of the presentation showed coterporally two bowls, of the same size, which evidently differed in the absolute number of contained balls. In the following one, each bowl was labelled with a tag showing the presence of red balls over the white, according to the format version. So, when required to say in which of the two balls they would draw, participants were presented with the two labelled figures.

Finally, for the Ticket/Money loss problem the current research used the following texts:

Ticket loss: A woman has bought two tickets to go to the theatre. Each ticket costs 80 euros. When she arrives at the theatre, she opens her bag and discovers that she has lost the tickets. Do you think she will buy the tickets to enter the theatre?

Money loss: A woman goes to the theatre and wants to buy two tickets that cost 80 euros each. She arrives at the theatre, opens her bag, and discovers that she has lost the 160 euros with which she was going to buy the tickets. She could use her credit card. Do you think she will buy the tickets to enter the theatre?

In both versions, the problems were introduced by a slide showing a theatre. The second slide, instead, showed the loss of the tickets or of the bills, according to the frame,

by displaying a cross on them. In the last slide, a question mark appeared next to the lost item.

The experiment session was followed by a questionnaire, verbally presented by the experimenter. In order to facilitate the final part of the test, the questionnaire was formulated in Osimano. It investigated: (a) age; (b) whether one had been exposed to Osimano in their childhood; (c) one's own Osimano proficiency in both comprehension and production (with a 10-point scale); (d) the estimated time of one's use of Osimano (in different contexts: at home, with friends, at work and in the town centre); (e) other languages proficiency (with a 10-point scale) and finally whether one had been exposed to other languages in their childhood.

3.2.3. Procedure

The experiments were conducted by an Osimano female speaker, who recruited people who declared to know and to use this dialect. The experiment took place in different contexts: in a clothing store of the city centre, in a local high school, in a dental office waiting room, in a dance school, in a campsite, in many bars and restaurants and finally at some participants' house.

Participants were tested individually.

The experimental session followed the same procedure for all the tests; thus, this latter will be described once and for all as follows. Problems were formulated acoustically and visually: while hearing the audio recording describing the problem, participants watched a PowerPoint presentation showing images concerning the described situation.

The presentation did not show any word, but only stylised images and a summary of numerical information heard along the recording.

There were not time constraints and participants had to verbally pronounce their answer once each problem had been heard. Responses could be binomial answers either between yes or no (in the Ticket-Money task), or between A and B (in the Asian Disease task and in the Bowls task), or between correct and incorrect responses (in the Basic Arithmetic task).

Along each session the four problems were formulated in the same language and participants were randomly assigned to a language condition. The order of the four problems and their versions had been created according to a randomized Latin square design.

The interactions between the experimenter and the participant occurred in the language corresponding to the version of the problem participants had been assigned to, apart for the last section of the experiment.

Before the session, it was specified that the answer had to be personal and that, for most of the problems, there were not a correct or incorrect answer.

Moreover, before starting, participants were informed that the test was anonymous and that they could interrupt their collaboration whenever they wanted. They were also required to sign a written consent at the end of the experimental session.

The final part of the session consisted of a 30 seconds audio recording of the response of the participant to the question “Do you have any plans for this summer?” or a spontaneous conversation. The recording was used to evaluate proficiency of the speakers involved in the study.

Two native speakers (aged 24 and 27 years) listened to all the oral productions (whose duration lasted on average 30 sec) and evaluated the level of Osimano proficiency

with a 5-point scale, where 1 corresponded to “low competences” and 5 to “excellent competences”, according to lexical, phonological and morpho-syntactic parameters. The mean proficiency rating was 3.22. Only speakers rated ≥ 2 were considered in the study.

3.3. Results

3.3.1. Asian Disease task

The number of participants presented with the gain and loss framing respectively was equal to 48 and 48 in Osimano, and 47 and 46 in Italian.

The results are reported in Table 2.

Table 2. Asian disease problem. Percentage of safe choices in language and frame conditions.

	Safe choice	
	Gain	Loss
Osimano	58.33%	54.17%
Italian	55.32%	41.30%

To verify whether the pattern obtained was statistically significant, in the present as well in further problems, responses were analysed using logistic regression models performed with the function `Glm` of the package `lme4` (Bates, Maechler, & Bolker, 2011) included in the software R (R Core Team, 2016) with Language and Frame as predictors.

The logistic regression model revealed that neither the factor Language ($p = .77$), nor the factor Frame ($p = .68$), nor their interaction ($p = .50$) were statistically significant.

In order to control for possible confounds due to the random assignment of participants to conditions the same logistic models were run, using sex gender and level of proficiency in Osimano as dependent variables (DV).

The analysis with gender as DV revealed a significant effect of Language ($\beta = -0.84$, $SE = 0.42$, $z = -1.97$, $p = .04$). In particular the effect was due to the fact that more female participants were assigned to the Italian condition (64.5%) with respect to the Osimano condition (57.3%). Table 3 displays the distribution of female participants in the different conditions of the experiment.

Table 3. Distribution of female participants in the different conditions of the experiment.

	Italian	Osimano
Gain frame	68.1%	47.9%
Loss frame	60.1%	66.7%

The Table shows that few female participants took part in the Osimano version of the problem especially in the gain frame condition. However, the interaction between language and frame did not reach the statistical level of significance ($p = .07$).

No significant effects were obtained in the analyses with level of proficiency ($p > .22$) or age ($p > .18$) as DVs.

No significant interaction between Frame and Language was obtained, differently from what was expected. The lack of a significant interaction however, was due to the small effect of frame observed in Italian. The framing effect in the Asian Disease problem is a very well-known effect replicated in many different experiments. Here, the obtained effect was 14.02% which is rather small if compared with the effect obtained in Italian

(33%) by Mello et al (2017) or by Costa et al. (2014) in L1 Spanish (34%) or by Keysar et al. (2012) in L1 English (30%).

Therefore, the absence of a significant effect here might be due to a II type error. As for the “critical” condition, Osimano, the results seemed in line with what observed by Mello et al. (2017): when the Asian disease problem was presented in Osimano, the percentage of people choosing the safe option in the loss condition increased, so that the loss aversion bias disappears.

It is interesting to note that here, as well as in Mello et al. (*ibid.*) and in the Foreign Language effect’s studies (Costa et al. 2014; Keysar et al., 2012), the absence of the loss aversion bias in the L2 (or Venetian) condition was due to a change in the loss frame.

3.3.2. Basic Arithmetic task

The number of participants presented with the frequency and the percentage version respectively was equal to 48 and 48 in Osimano, and 47 and 46 in Italian.

Table 4 below shows the rate of correct responses obtained in this problem.

Table 4. Basic Arithmetic problem. Percentage of correct responses obtained according to the version, percentage (2%) vs. frequency (2 out of 100), and language.

	Osimano	Italian
	Correct responses	Correct responses
Percentage	81.25%	63.04%
Frequency	81.25%	61.70%

The regression model with Version and Language as predictors showed a significant effect of language ($\beta = -9.89$, $SE = 4.76$, $z = -2.07$, $p = .03$). As can be seen from Table 4,

in Osimano participants were more accurate than in Italian, independently of the version of the problem.

In order to control for possible effects due to gender, age and level of proficiency in Osimano, we run regression analyses with Language and Version as predictors and gender, age and level of proficiency as DVs. As in the previous problem, we found an effect of language in the analysis of gender ($\beta = -0.84$, $SE = 0.42$, $z = -1.97$, $p = .04$).

Table 5 displays the distribution of female participants in the different conditions of the experiments. Fewer female participants took part in the Osimano condition of the problem, in particular in the Frequency version, even if the interaction between the Language and Version did not reach the conventional level of significance ($p = .07$).

Table 5. Basic Arithmetic task. Rate of female participants in the different conditions.

	Osimano	Italian
Frequency	38.4%	75.9%
Percentage	66.67%	65.6%

The results obtained showed a better performance in the Osimano condition.

This effect might be confounded with gender, given that larger proportion of male participants was assigned to this condition. Table 6 reports the distribution of correct answer across genders. It is evident that the language effect cannot be attributed to a gender effect, given that the rate of correct answers in the Osimano condition was higher for both male and female participants.

Table 6. Basic Arithmetic task. Correct answers with respect to gender distribution.

	Italian		Osimano	
	Female	Male	Female	Male
Frequency	68.75%	46.66%	65.21%	96%
Percentage	67.85%	55.55%	81.25%	81.25%

The analyses with age and level of proficiency in Osimano as DVs did not show significant effects.

3.3.3. Bowls task

The number of participants presented with the frequency and the percentage version of the Bowls problem was equal to 48 and 48 in Osimano, and 47 and 46 in Italian.

Table 7 displays the percentage of participants choosing the bowl A, i.e. the bowl with a large absolute number of red balls (9), but a smaller rate of red balls with respect to white balls (9%). This choice has been described as a sub-optimal, since the probability to get a red ball was higher with bowl B (10%) than with bowl A.

In the frequency version of the problem participants were informed that bowl A contained 9 red balls on 100 balls. In the percentage version participants were informed that the bowl A contained the 9% of red balls.

Table 7. Bowls problem. Percentage of bowl A choices in the different conditions.

	Osimano	Italian
Bowl A		
Frequency	17.78%	42.22%%
Percentage	31.37%%	47.92%

The regression model with Version (percentage vs. frequency) and Language (Italian vs. Osimano) as predictors showed a significant effect of Language ($\beta = -1.21$, $SE = 0.4$, $z = -2.4$, $p = .01$). As can be seen from Table 7, Bowl A was chosen less often when the task was performed in Osimano with respect to Italian.

Similarly to what had been observed in previous studies (Denes-Raj et al.,1994; Kirkpatrick et al.,1992), participants who made the nonoptional choice (Bowl A) often reported that, despite being aware that their choice was “risky” and objectively inconvenient, they had selected it since they felt “lucky” and perceived that bowl as more appealing.

The regression analyses performed to control for the effect of gender, age or level of proficiency did not show significant effects.

Contrary to the initial predictions, in this task the suboptimal choices were more frequent in Italian than in Osimano.

3.3.4. Ticket-Money Loss task

The number of participants presented with the Money loss and the Ticket loss frame respectively was equal to 50 and 43 in Italian, and 46 and 50 in Osimano.

Table 8 reports the rate of participants thinking that the woman would (re)buy the tickets after having loss either the money or the tickets in the two language conditions.

Table 8. Ticket/Money Loss problem. Percentage of “yes” responses (i.e., Yes the woman would buy the tickets) in the different conditions of the task.

Loss	Osimano	Italian
Ticket	24%	44.19%
Money	65.22%	64%

The regression model with Version (Ticket vs. Money loss) and Language (Italian vs. Osimano) as predictors showed a significant effect of Version ($\beta = -1.78$, $SE = 0.45$, $z = -3.93$, $p < .001$). Even if the effect seemed larger in Osimano than in Italian, the interaction between Frame and Language did not reach the conventional level of significance ($p = .12$). The regression analysis performed with age, gender and proficiency level as DV did not show any significant effect, suggesting that the framing effect was independent from these variables.

As described in the literature (Costa et al., 2014; Tversky and Kahneman, 1981) the well-known framing effect was replicated. People were more prone to think that a woman would buy the tickets in the money loss condition than in the ticket loss condition. This framing effect, however, seemed not to be modulated by language.

3.3.5. Subjective and objective proficiency ratings in Osimano

Graph 1 illustrates the distribution of participants' subjective proficiency ratings of production of Osimano on a 0-10 point scale; Graph 2 illustrates the distribution of their subjective proficiency ratings of comprehension of Osimano on a 0-10 point scale and Graph 3 illustrates the objective proficiency ratings given by two proficient speakers (about participants' oral performance).

This latter measure was initially a 1-5 point scale and was then standardized on a 0-10 point scale, in order to directly make a comparison between the different measures.

The ratings reported according to the three measures for each participant are displayed in Appendix F.

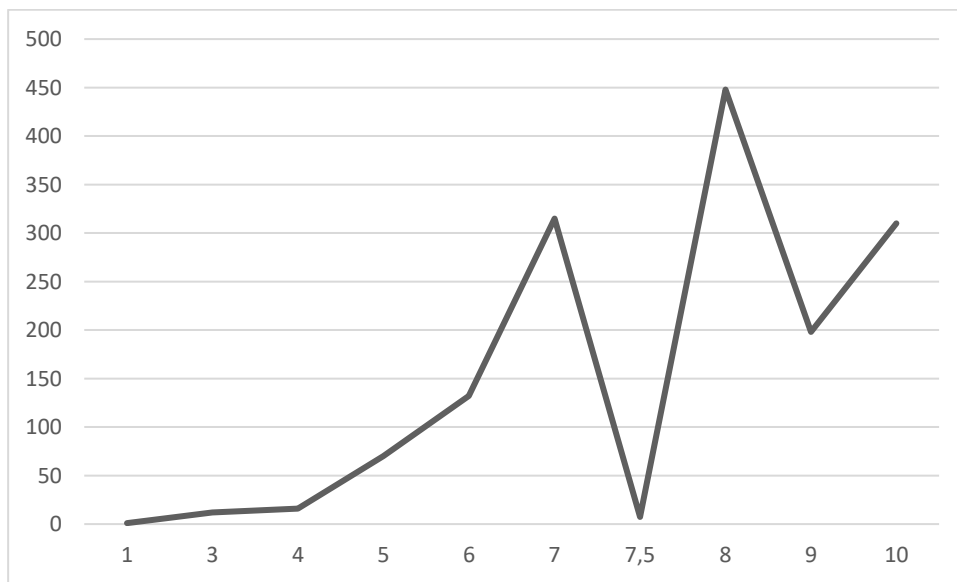
The average of ratings reported by participants in the self-evaluation of comprehension and production of Osimano were respectively equal to 8.54 and 7.54.

The average of objective scores given by proficient speakers was equal to 6.23.

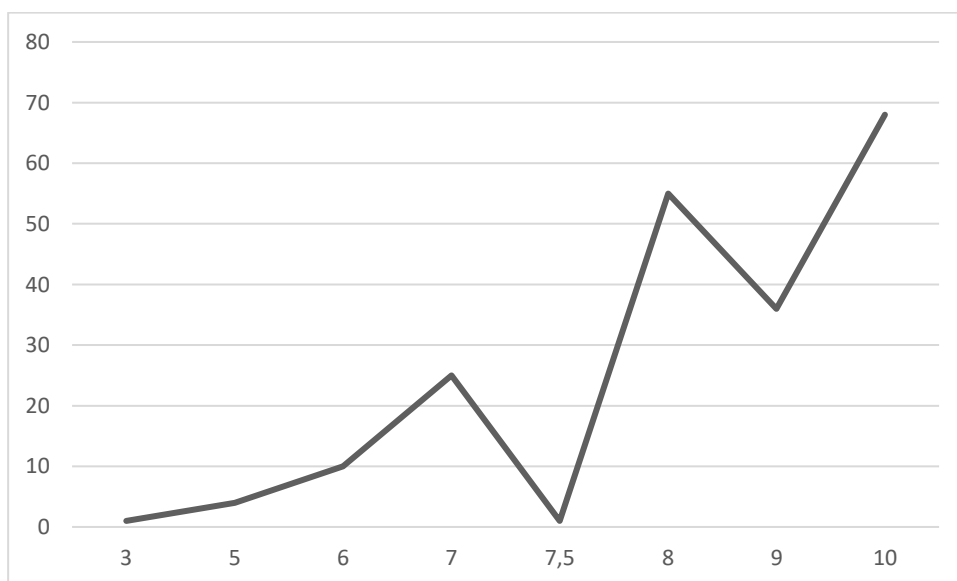
The correlation found between the objective proficiency ratings and the subjective proficiency ratings in production was equal to 0.24, whereas the correlation found between the objective proficiency ratings and the subjective proficiency ratings of comprehension was equal to 0.18.

In conclusion, the two different measure showed a very low correlation level.

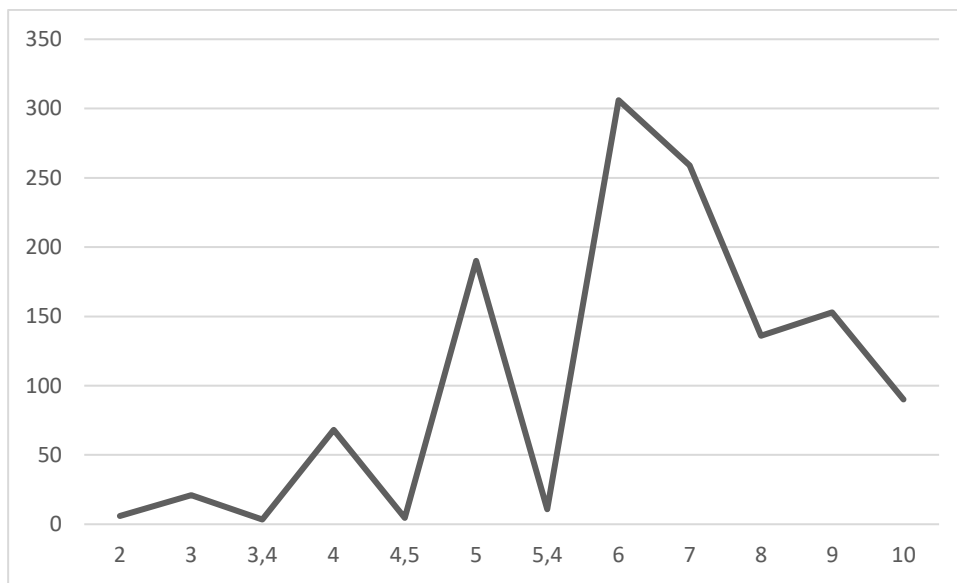
Graph 1. Subjective proficiency ratings of production of Osimano.



Graph 2. Subjective proficiency ratings of comprehension of Osimano.



Graph 3. Objective proficiency ratings of Osimano.



4. General Discussion

The present study was aimed at testing the effect of language, Italian Vs. Osimano, on a series of decisions problems.

In particular the Asian disease task was used in order to establish whether the results found in previous studies with other dialects could be replicated. We expected to find a modulation of the framing effect due to language so that the framing effect should be reduced in Osimano with respect to Italian.

The Basic Arithmetic problem and the Bowls problem were used to verify the hypothesis of a different access to numerical information in Italian and in Osimano.

Participants were expected to be more correct in the former task and to perform less sub-optimal choices in the latter task, when they used Italian with respect to Osimano.

Finally, the Ticket-Money Loss problem was used as a control task: since this task is an accounting task not involving numerical computations, we did expect to find no modulation of the framing effect according to language.

The pattern of results we obtained was only partially congruent with our hypotheses.

In the Asian Disease task, we did not find the expected interaction between language and frame. Indeed, no framing effect was observed. The difference between the Loss and Gain frame obtained in Italian was in the expected condition (i.e., a larger preference for the safe option in the gain frame than in the loss frame) but it was too smaller than the difference reported for Italian (Mello et al., 2017) or for other native languages (Costa et al., 2014; Keysar et al., 2012) in literature.

However, similarly to what was observed in Mello et al. (2017)'s study using dialect, and in other studies using foreign languages (e.g. Costa et al., 2014; Keysar et al., 2012) the percentage of participants choosing the safe option in the loss and in the gain frame was the same when using Osimano. Thereby, the results found in this task, despite not

replicating the significant interaction between Frame and Language, were in line with results reported by Mello et al. (2017) and with what was observed by previous studies with foreign languages (Costa et al., 2014; Keysar et al, 2012).

In the Basic Arithmetic problem, a significant effect of language was found. However, the direction of the effect was opposite with respect to the predictions.

Participants gave correct responses more frequently in the Osimano than in the Italian condition. It should be noted, however, that this effect might be partially confounded with a gender effect, given that, due to the random assignment of participants to conditions, more male participants were assigned to the Osimano condition than to the Italian condition.

In any case, the results are not in line with the hypothesis put forward by Mello et al. (2017) according to which numerical information is less accessible in a language in which arithmetic is not learned, even if this language is very well known and frequently used.

Similar conclusion can be drawn from the results obtained in the Bowls problem task in which individuals chose the inconvenient bowl (i.e. the bowl with the lower probability of drawing a red ball) more frequently in the Italian than in the dialectal condition. Since this task involved probability computation, the results obtained were not in line with the prediction that numerical information should be less accessible in Osimano than in Italian.

Moreover, the fact that participants who made the non-optimal choice reported to be aware about the irrationality of their choice (Denes-Raj et al.,1994; Kirkpatrick et al., 1992) seems to suggest that probability computation was not driving participants' choices in this task.

Finally, as expected, the Ticket Money Loss task showed the framing effect not modulated by language. Participants were less likely to think that the woman would buy

the tickets in the ticket loss condition than in the money loss condition. This effect was present both in the Italian and Osimano condition. This result replicated what previous studies (Tversky and Kahneman, 1981) had found.

Overall, the results of the present study allow us to derive a set of important conclusions.

First of all, they show that the results obtained with Venetian, but also with foreign languages, extend to Osimano. Even if the results obtained with the Asian Disease were not fully supported by statistical analyses, the pattern obtained with Osimano was clear cut, by showing no loss aversion bias in this condition.

Second, they did not support the hypothesis put forward by Mello et al. (2017). The problems testing numerical abilities showed a higher level of accuracy and appropriateness when the task was performed in Osimano, with respect to Italian.

Furthermore, the fact that participants were often aware of choosing the less convenient option when they performed the suboptimal choice in the Bowls task seems to suggest that this problem is not appropriate to highlight differences in numerical abilities, contrary to what have been suggested by Peters et al. (2006).

These results might hint at the possibility that Italian access to numerical information is more automatized than Osimano, as it is the language used for the acquisition of numeracy. When dealing with numeracy in Osimano, which is not normally used for mathematical operations, people might perceive this task as more difficult to resolve.

In fact, as observed by Marian et al. (2000), specific life experiences (e.g., learnt numerical concepts, in this case) are less accessible when retrieved in a language different from that used for the codification. Thus, the less automatized way in which number

processing occurs in Osimano might entail more analytic reasoning (Alter et al. 2007), leading to more accurate outcomes.

Of course, also in light of the fact that the language effect observed in the Basic Arithmetic task might be partially confounded with a gender effect, this remains a speculative argument which deserves further research with Italian dialects or analogous forms of bilingualism.

Finally, the fact that in the Ticket money loss problem no differences were found according to language shows that changing language not always produces a different outcome. This result is important because it leads to hypothesize that the differences observed between Italian and dialect might be due a "distraction" effect.

The audio in a regional language format may create a distracting effect compared to Italian: the individual listens to the sound of the language more than they pay attention to its' content because hearing the regional language is pleasant and captures attention.

According to such hypothesis, though, decisions in dialect should always lead to a different outcome with respect to Italian.

Having tasks for which no differences between language conditions were observed might therefore critically contribute to finding out which are the boundary condition of the language effect, helping in this way to better understand its nature.

For what concerns the issue of the different measures of proficiency, the correlation between self-estimated proficiency and external judges' evaluations was very low. This was due both to the fact that participants overrated and underestimated their own proficiency in Osimano with respect to the external evaluation received.

As can be seen from Appendix F, participants who considered themselves as proficient speakers of Osimano sometimes were rated with lower scores (see participants n°2,8,9,10), whereas participants who considered their proficiency of Osimano low,

sometimes received higher scores by proficient native speakers (see participants n°5,12,56,65). Two explanations can be put forward in order to account for these results.

First, these findings could derive from a mere lack of self-awareness of language proficiency: an informal and not-institutional language, used in familiar contexts is not easy to evaluate.

Otherwise, they could reflect the sociolinguistic situation. In fact, as mentioned in 2.1 chapter, on the one hand a hostile attitude towards this dialect persists, which could be the reason why participants who scored a high evaluation considered themselves not proficient speakers; on the other hand, the stereotyped consideration of dialects in Italy is vanishing and a strong willingness to preserve and revalue it is rising, which could be the reason why participants attributed themselves a high rating, despite not being evaluated the same way.

Finally, these discrepancies between the two measures of rating might rely on the fact that people nowadays consider Osimano as something obsolete that “completely changed”. In fact, a huge number of participants reported not being as proficient as their grandparents were, even because they feel they have less chance to use it today, with respect to them.

Others reported that Osimano underwent an “Italianization” in the last decades, and this led them to consider it as “almost no longer existing”, a consideration which might potentially have a noticeable impact on the self-proficiency evaluation.

Clearly, all these arguments have to be considered as purely speculative.

However, the two measures of ratings were shown not to overlap and the nature of this discrepancy has to be investigated in further research.

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Sitography

<http://www.atlantelinguistico.it>

<http://www.camera.it/parlam/leggi/99482l.htm>

Appendix section

Appendix A. Italian and Osimano translations of Asian disease problem.

Gain frame

Italian /Ultimamente si sta propagando una pericolosa malattia. Senza una medicina 600 persone moriranno. Al fine di salvare queste persone sono stati creati due tipi di medicine./

Se scegli la medicina A saranno salvate 200 persone.

Se scegli la medicina B c'è una probabilità del 33,3% che 600 persone saranno salvate e una probabilità del 66,6% che nessuno sarà salvato. Quale medicina scegli?/

Osimano /Nte ssi giorni se sta a diffonde na malattia brutta n bel po?. Senza na medicina 600 cristià morene. Pe salva sti cristià hanne creato du tipi de medicine./

Se scei la medicina A se salvene 200 cristià.

Se scei la medicina B c'è na probabilità del 33,3% che 600 cristià se salvene e na probabilità del 66,6% che nisciuno se salva. Quala medicina scei?/

Loss frame

Italian /Ultimamente si sta propagando una nuova pericolosa malattia. Senza una medicina 600 persone moriranno. Al fine di salvare queste persone sono stati creati due tipi di medicine./

Se scegli la medicina A moriranno 400 persone.

Se scegli la medicina B c'è una probabilità del 33,3% che nessuno morirà e una probabilità del 66,6% che 600 persone moriranno.
Quale medicina scegli?/

Osimano /Nte ssi giorni se sta a diffonde na malattia brutta n bel po'.
Senza na medicina 600 cristià morene. Pe salva sti cristià hanne creato du tipi de medicine./
Se sceji la medicina A morene 400 cristià. Se sceji la medicina B c'è na probabilità del 33,3% che nisciuno more e na probabilità del 66,6% che 600 cristià morene.
Quala medicina sceji?/

Appendix B. Italian and Osimano translations of Basic Arithmetic problem.

Percentage frame

Italian /Se per una persona, il rischio di prendersi una malattia è dell'1% in 10 anni,/ e per una seconda persona il rischio è il doppio della prima persona, / qual è il rischio per la seconda persona?
Ti ripeto la domanda: per la seconda persona il rischio è il doppio della prima persona, qual è il rischio per la seconda persona?/

Osimano /Se pe 'n cristià il rischio de beccasse 'na malattia è del 1% in 10 anni,/ e pe n' secondo cristià il rischio è 'l doppio del primo,/ qualo saria 'l rischio pel secondo cristià?
Te lo dummano n'antra ò: pel secondo cristià 'l rischio è 'l doppio del primo, qualo saria 'l rischio pel secondo cristià?/

Frequency frame

Italian /Se per una persona il rischio di prendersi una malattia è di 1 su 100 in 10 anni,/ e per una seconda persona il rischio è il doppio della prima persona,/ qual è il rischio per la seconda persona?
Ti ripeto la domanda: per la seconda persona il rischio è il doppio della prima persona, qual è il rischio per la seconda persona?/

Osimano /Se pe 'n cristià 'l rischio de beccasse 'na malattia è de 1 su 100 in 10 anni,/ e pe n'secondo cristià 'l rischio è 'l doppio del primo,/ qualo saria 'l rischio pel secondo cristià?
Te lo dummano n'antra ò: pel secondo cristià 'l rischio è 'l doppio del primo. Qualo saria 'l rischio pel secondo cristià?/

Appendix C. Italian and Osimano translations of Bows problem.

Percentage frame

Italian /Ci sono due vasi con dentro delle palline bianche e rosse. Devi pescare una pallina da uno dei due vasi. Guadagnerai 5 euro se la pallina che peschi è rossa./ Con il primo vaso hai il 9% di possibilità di pescare una pallina rossa. Con il secondo vaso hai il 10% di possibilità di pescare una pallina rossa. In quale vaso peschi?/

Osimano /Ce so do vasi co dentro n po' de pалette bianche e rosce. Dei pescà na palletta da uno de ssi do vasi. Vinci 5 euri se la palletta

che peschi è roscia./ Col primo vaso c'hai il 9% de probabilità de pesca la palletta roscia. Col secondo vaso c'hai il 10% de probabilità de pescà la palletta roscia. nte qualo vaso peschi?/

Frequency frame

Italian /Ci sono due vasi con dentro delle palline bianche e rosse. Devi pescare una pallina da uno dei due vasi. Guadagnerai 5 euro se la pallina che peschi è rossa./ Nel il primo vaso ci sono nove palline rosse su cento. Nel il secondo vaso c'è una pallina rossa su dieci. In quale vaso peschi?/

Osimano /Ce so do vasi co dentro npo' de pallette bianche e rosce. Dei pescà na palletta da uno de ssi do vasi. Vinci 5 euri se la palletta che peschi è roscia./ Ntel primo vaso ce so nove pallette rosce su cento. Ntel secondo vaso c'è na palletta roscia su dieci. Nte qualo vaso peschi?/

Appendix D. Italian and Osimano translations of Ticket/Money loss problem.

Ticket loss

Italian /Una signora ha comprato due biglietti per il teatro. Ogni biglietto le è costato 80 euro./ Quando arriva a teatro, apre la borsa e si accorge di aver perso i biglietti./ Pensi che comprerà i biglietti per andare a teatro?/

Osimano /Na signora ha cumprado do biglietti pel teatro. Ogni biglietto j'ha costado 80 euri./ Quanno rria a teatro, apre la borsa e se

ccorge de avé perso i bijetti./ Pensi che li compra i bijetti pe ndà a teatro?/

Money loss

Italian /Una signora vuole comprare due biglietti per il teatro. Ogni biglietto le costa 80 euro./ Quando arriva a teatro, apre la borsa e si accorge di aver perso i 160€ con cui avrebbe dovuto comprare i biglietti./ Potrebbe usare la sua carta di credito. Pensi che comprerà i biglietti per andare a teatro?/

Osimano /Na signora vole comprà do bijetti pel teatro. Ogni bijetto je costa 80 euri./ Quando rria a teatro, apre la borsa e se ccorge de avé perso i 160€ che ce dovea pià i biglietti./ Po' usà la carta de credito. Pensi che li compra i biglietti pe ndà a teatro?/

Appendix E. Duration of PowerPoint slides.

- Asian disease problem. Gain frame:

Osimano: 14 / 22.26 sec

Italian: 14/ 22.53 sec

- Asian disease problem. Loss frame:

Osimano: 13,35 / 20.80 sec

Italian: 1349 / 20.44 sec

- Basic Arithmetic problem. Frequency frame:

Osimano: 7.38 / 4.92/ 12.84 sec

Italian: 7.30/ 4.80/ 12.63 sec

- Basic Arithmetic problem. Percentage frame:

Osimano: 6.74/ 5.03/ 13.05 sec

Italian: 6.53/ 5.30/ 15.41 sec

- Bowls problem. Frequency frame:

Osimano: 13.70/ 11.40 sec

Italian: 13.80 / 10.70 sec

- Bowls problem. Percentage frame:

Osimano: 13.80/ 15.08 sec

Italian: 13.70 / 15.10 sec

- Ticket loss problem:

Osimano: 6.64/ 5.56/ 3.64 sec

Italian: 6.63/ 5.03/ 2.89 sec

- Money loss problem:

Osimano: 6.31/ 10.17/ 3.42 sec

Italian: 6.85/ 10.59 / 3.38 sec

Appendix F. Self-evaluation of Osimano proficiency and proficient speakers' evaluation.

Participant n°	Subjective proficiency ratings: comprehension	Subjective proficiency ratings: production	Objective proficiency ratings
1	8	8	6
2	10	10	6
3	7	7	5
4	8	8	9
5	3	3	6
6	7	7	6

7	10	8	7
8	10	10	6
9	10	8	6
10	10	10	5
11	8	8	6
12	7	7	10
13	8	8	6
14	8	8	7
15	7	7	7
16	8	8	5
17	8	8	8
18	8	8	7
19	7	7	6
20	8	8	5
21	9	9	4
22	8	8	2
23	9	9	9
24	7	7	7
25	10	10	7
26	7,5	7,5	6
27	8	8	8
28	10	5	8
29	10	6	6
30	7	4	7
31	8	7	5
32	9	7	6
33	9	9	7
34	9	6	2
35	9	7	6
36	8	7	6
37	8	7	4
38	8	10	10

39	9	8	7
40	8	6	7
41	9	9	7
42	8	5	7
43	6	6	4
44	8	7	4
45	7	7	7
46	8	8	6
47	8	8	9
48	10	10	4
49	8	7	6
50	8	7	5
51	9	7	5
52	7	8	6
53	8	8	7
54	10	9	6
55	7	8	7
56	7	7	8
57	9	9	4
58	8	8	5
59	9	7	6
60	7	7	7
61	8	8	5
62	7	3	3
63	9	8	9
64	9	8	3
65	9	5	10
66	10	8	5
67	9	8	9
68	10	10	7
69	8	7	4
70	10	10	9

71	10	9	7
72	10	10	7
73	10	10	10
74	6	3	6
75	9	8	9
76	10	7	10
77	6	4	5
78	10	7	6
79	9	8	7
80	10	8	9
81	10	10	9
82	7	7	9
83	9	9	8
84	10	8	5
85	8	5	5
86	10	7	6
87	10	10	10
88	10	7	9
89	9	8	9
90	7	7	9
91	8	7	7
92	9	8	6
93	7	7	3
94	10	9	9
95	7	6	7
96	10	6	5
97	7	7	5
98	10	7	6
99	10	7	5
100	7	8	5
101	8	7	6
102	10	10	5

103	10	8	6
104	7	8	6
105	9	9	6
106	8	7	6
107	8	7	6
108	9	8	7
109	10	5	8
110	10	8	6
111	10	9	7
112	10	8	5
113	7	8	6
114	10	8	7
115	7	7	5
116	8	7	8
117	8	9	6
118	7	3	3
119	6	5	6
120	8	7	5
121	9	7	6
122	10	6	5
123	6	6	5
124	8	9	5
125	6	6	4
126	6	6	6
127	6	5	3
128	10	8	5,4
129	6	8	7
130	8	9	10
131	10	6	5
132	9	8	6
133	10	8	9
134	10	8	8

135	10	10	6
136	8	8	10
137	8	7	8
138	9	10	6
139	8	8	6
140	10	10	6
141	9	9	6
142	10	6	6
143	10	5	7
144	9	8	5
145	10	8	8
146	10	9	7
147	10	10	8
148	10	8	5
149	9	9	5
150	10	10	8
151	10	10	8
152	10	8	5
153	9	6	6
154	5	5	6
155	5	1	4
156	8	8	5
157	10	10	7
158	7	8	5
159	8	8	5
160	10	10	5
161	9	10	7
162	10	10	6
163	8	10	4
164	5	4	5
165	9	4	4
166	8	6	3,4

167	8	6	3
168	10	10	6
169	6	6	7
170	5	6	4
171	9	8	5,4
172	8	10	7
173	10	10	4
174	8	6	7
175	10	7	5
176	10	6	4
177	8	6	4
178	10	7	7
179	10	8	10
180	8	9	8
181	8	5	3
182	8	7	6
183	8	7	4,5
184	10	10	9
185	8	5	7
186	9	9	6
187	8	5	7
188	10	10	8
189	10	8	4
190	10	10	5
191	10	6	6
192	9	5	9
193	10	9	6
194	9	5	5
195	9	9	5
196	10	10	8
197	8	6	8
198	10	9	2

199	8	7	7
200	7	7	4

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