

**Give me your point of view**  
**An EEG study on the role of perspective-taking in the**  
**assessment of value-loaded statements**

Master Thesis  
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## Abstract

Recent neuroimaging and neurophysiological studies have pointed to the impact of our value-system on the way we process value-loaded language. In these studies well-known ERP components, such as the N400 and the Late Positive Potential, have been taken to reflect rapid evaluation of and reaction to value-laden statements. In the same line of research, the current study used ERPs to examine processing of value-loaded statements, in relation to the personality trait of *perspective-taking*. People with high perspective-taking skills exhibited an early ERP effect, which discriminated value-inconsistent from value-consistent statements. This effect did not appear in the low perspective-taking group. I suggest that this divergence reveals a differential organization of the value-systems in the two groups, due to their differences with respect to the personality trait of perspective-taking. Overall, the present findings are highlighting an interesting interaction between language-processing, ideology, and perspective-taking.

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## 1. Values and Language Processing

The relation between language and ideology has been tackled by a small number of studies and yet, the findings are quite revealing: the system of beliefs and values each of us carries has a direct impact on the way we process linguistic input and, secondarily, on the way we assess this input. The relevant indications are both of behavioral and neurophysiological nature.

For example, partisans rate the degree of contradiction between two inconsistent statements or actions depending on whether the contradiction pertains to the candidate president of the party they support, the candidate of an opposite party, or a politically neutral person (Westen, Blagov, Harenski, Kilts, & Hamann, 2009). This is an instance of *motivated reasoning* “a form of implicit emotion regulation in which the brain converges on judgments that minimize negative and maximize positive affect states associated with threat to or attainment of motives” (Westen et al., 2009, p. 1947). Westen and his colleagues used fMRI to scan two groups of partisans, democrats and republicans, and studied their reactions while they were presented with slides containing statements that exhibited inconsistencies on behalf of the three above-mentioned types of persons. Partisans rated inconsistencies of their preferred candidate as “less severe” than those of the antagonist candidate. This pattern of responses was attributed to motivated reasoning, as supported by activation in particular neural circuits in the medial and lateral orbital prefrontal cortex, the anterior cingulate cortex, the insula, the posterior cingulate, and the precuneus, and parietal cortex, only when participants faced a contradiction attributed to their preferred candidate. Thus, motivated reasoning seems to be summoned up by partisans to countervail the distress experienced by the encounter of an inconsistency on behalf of the candidate they support. The underestimation of such inconsistencies is less emotionally threatening to them and this can explain why devoted partisans are widely witnessed to be more “pliant” to inconsistencies or mistakes of *their* political leader. Our “political” brain is, thus, emotional and does not evaluate linguistic information on the basis of objective facts, but rather entails reasoning mechanisms closely connected, neurally and behaviorally, with emotional mechanisms. (Westen, 2007). Crucially, although the above results address the ideology–reasoning interplay, they report on the ideology–language interface indirectly, as the material of the experiment above was clearly linguistic. What participants were basically asked to do in this study, was to *evaluate* the content of the linguistic stimuli they were reading.

In a study tackling precisely the core of the values–language-processing interaction, Van Berkum, Holleman, Nieuwland, Otten, and Murre (2009) uncovered differential neurophysiological reactions of people to statements that are in line with, or in contrast to their beliefs. Van Berkum and his colleagues EEG-recorded two kinds of participants, strict-Christians and Liberals, while they were completing an attitude survey. Respondents encountered and rated statements such as (1) and (2) on a 4-point scale of agreement.

(1) I think euthanasia is an *acceptable* course of action.

(2) I think euthanasia is an *unacceptable* course of action.

Obviously, the two types of statements had the exact opposite ideological status for the two groups, as those that were ideologically acceptable for the members of the one group were unacceptable for the other. Participants' EEG activity was measured upon the critical words that revealed the ideological direction of the statements and compared across the two conditions. The results showed that words signaling an inconsistent statement were accompanied by three ERP effects, an early positivity from 200 to 250ms, an N400 and a Late Positive Potential (LPP), in both groups of participants. As expected, these words were the exact opposite for the two groups. Van Berkum et al. argue that the N400 reflects a difficulty in meaning computation when statements to be read oppose one's value-system. On the other hand, they consider the two positivities to actually be a unique positive component, a long-lasting LPP temporarily countervailed by the negativity of the N400 component. In line with the literature, the LPP was deemed to demonstrate that value-inconsistent statements are perceived as aversive stimuli, thus recruiting extra emotion-related processing mechanisms. The findings by Van Berkum et al. suggest that as soon as an unfolding statement turns out to be ideologically adversarial it is instantly identified by the brain, and that emotion has its share in the identification of the statement as such.

In a slightly modified study, conservative and liberal students also displayed different patterns of EEG responses to morally invested statements (Graham et al., 2012). This time, the focus was on implicit morality in relation to *Moral Foundations* theory. *Moral Foundations* theory posits five basic moral foundations, namely care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, and sanctity/degradation, upon which the liberal and conservative moralities are differentially based. For instance, liberal people have been shown to consciously stick more to the care and fairness foundations, whereas conservatives have been

proven to build their morality primarily upon the loyalty, authority and sanctity foundations (Graham et al., 2009, cited in Graham et al. 2012). Graham and his colleagues using the same method and a similar design to that of Van Berkum et al. (2009) tested the hypothesis that liberals have implicit moral judgments that contradict their consciously endorsed moral values. Since here the focus was more on liberals' and conservatives' moral foundations, the distinction between the statements was not only based on their compatibility with participants' ideology, but also on the particular moral foundation to which these referred. As a consequence, there were statements consistent and inconsistent with the care and fairness (CF) (bases of the liberal ideology) and with the loyalty, authority and sanctity (LAS) foundations (the bases of the conservative ideology). As predicted, in general liberals agreed with the pro-CF and the anti-LAS statements, and disagreed with the anti-CF and pro-LAS statements. Conservatives, showed the exact opposite pattern of behavioral responses. Furthermore, liberal participants displayed an LPP effect on words marking statements consistent with the loyalty, authority and sanctity values. Finally, both conservatives and liberals exhibited an LPP effect elicited by statements that were against the loyalty, authority and sanctity foundations. Interestingly, for the liberals, the LPP effect was bigger in the first case than in the second.

The first ERP effect is partly in line with Van Berkum et al. (2009), as statements in support of the loyalty, authority and sanctity values are –at least superficially– inconsistent with the liberal value-system. Nevertheless although participants in Van Berkum et al.'s study exhibited both an LPP and an N400 effect on critical words of inconsistent statements, in this case only an LPP effect was detected. As for the finding that both liberals and conservatives exhibited an LLP component upon words signaling statements opposing the loyalty, authority and sanctity values, the authors take it to prove that liberals rely on moral foundations that they do not consciously endorse. Finally, the fact that liberals –consciously– agreed with the anti-loyalty/authority/sanctity statements and disagreed with the pro-loyalty/authority/sanctity statements matches the different LPP effect-sizes in the two cases.

Although the above results are a fertile field for discussion and future research, what is of interest here is that the study by Graham et al. is no less a study of the language-value interface than is the one by Van Berkum et al. (2009). Graham and colleagues used language as the *means* to study aspects of social and moral cognition. And given the similarity of the design and material of this study to that of Van Berkum et al. (2009), these findings can, as well, be taken to bear on the domain



of interest here: they point to the immediate reactions of the brain to statements that trigger someone's ideas and beliefs.

### 1.1 Perspective taking

As shown thus far, in general, particular neural circuits and mechanisms are recruited to process linguistic material that is somehow related to the transmission of moral or ideological information. Furthermore, people react *differently* to such material, depending on their ideological and moral "background". Zooming in a bit more, the question arises whether people carrying the same set of values, have dissimilar reactions depending on other assets, such as aspects of their personality.

A personality trait that possibly interferes in interesting ways with the value-language interface is that of perspective-taking. Perspective-taking reflects "spontaneous attempts to adopt the perspectives of other people and see things from their point of view" (Davis, 1980, p. 85). Although it is widely considered to be an inextricable component of empathy, it is highlighted as a *cognitive* rather than an emotional one (Davis, 1980, Simone, 2011). Interestingly, it has been proposed as an evolutionary secondary, evolved mechanism built upon more primitive hard-wired mechanisms of emotional empathy, both phylogenetically and ontogenetically (de Waal, 2008).

A reasonable hypothesis is that the degree of people's perspective-taking might influence the extent to which they negotiate their own values and beliefs. Being able to "enter into other people's shoes" means being able to understand and momentarily adopt other ways of thinking and action, and hence, beliefs and values. As a higher-order cognitive mechanism, perspective-taking might be at play when people manage to briefly discard their emotionally rooted values and beliefs and show understanding for those of their fellows. Thus, "perspective-taking" as a personality characteristic, and one's flexibility or rigidity as concerns their values and beliefs are hereby supposed to be in an interactive relation. More importantly, given the role of values and beliefs for speech processing, perspective-taking by its assumed impact on the operation of values and beliefs within individuals is likely to indirectly affect the way ideologically-loaded language is processed.

## 1.2 The present study

The present study is a follow-up of Van Berkum et al. (2009) taking also into account the personality trait of perspective-taking. Given that the design is quasi-identical to that of the original study, I predicted participants' EEG responses to be modulated by the consistency of the statements they read, in a way that they exhibit an N400 and an LPP component upon words signaling inconsistency of the statements with their value-system. The newly-added variable of personality, perspective-taking, is expected to modulate participants' reactions as well. As perspective-taking is considered to represent one's ability to understand and adopt different points of views, it is hypothesized that people high in perspective-taking are less "stuck" to their own ideas and beliefs and, that they will be more "unsusceptible" to value-inconsistent statements. I expect, thus, the physiological reactions of high-perspective-takers to value-inconsistent statements to be more moderate, as compared to those of people who are characterized by this ability to a lesser degree.

## 2. Method

### 2.1 Participants

40 right-handed university students, native speakers of Dutch participated in the experiment, 31 of which were female and 9 male (mean age: 22; range: 19-28). They self-reported to be non-dyslexic and free of neurological disorders, and they signed a form of "informed consent" before starting. They were paid for their participation. Recruitment was carried out through the Uil-OTS participants database.

In contrast to Van Berkum et al. (2009), the present experiment included participants belonging to just one edge of the political-ideological continuum. For this reason, subjects were asked to participate only if they were liberals in the wide sense, that is, ideologically progressive and anti-traditionalists. The inclusion criterion was their voting behavior, namely whether they opt for one of the following liberal Dutch parties: SP, Groen Links, PvdA, D66, and VVD.

## 2.2 Material and design

The material used in this study was taken from Van Berkum et al. (2009). Given the liberal political orientation of our subjects, the two versions of the 90 critical statements were either consistent or inconsistent with their value-system, as depicted in sentences (3) and (4), translated from Dutch.

(3) I think euthanasia is an *acceptable* course of action.

(4) I think euthanasia is an *unacceptable* course of action.

In these items the critical word upon which EEG activity was measured appeared rather late in the course of the sentence, and gave the “ideological identity” of the statement. In another 90 control items, the critical word was placed at the beginning (cf. (5) & (6)).

(5) I think it is *acceptable* that people consider euthanasia.

(6) I think it is *unacceptable* that people consider euthanasia.

Critical words were controlled for mean presentation duration (554 vs. 550 ms), length (9.7 vs. 9.2 letters), and Celex word frequency (51.5 vs. 46.6 per million, 2.6 vs. 2.7 log-transformed). Hence, participants’ EEG responses were expected to differ across (3) and (4), as manipulated by the ideological consistency of the relevant statements. On the contrary, in the control items the same critical words of the experimental items appear in an earlier position in the course of the statement and are, thus, not expected to elicit differential EEG responses, as the sentence content has not yet sufficiently unfolded, and the statement at this point is still devoid of a concrete meaning.

## 2.3 Personality questionnaire

Since the purpose of the present study was to explore how people’s ideological positions and their capacity to adopt different perspectives jointly affect the way they process ideologically invested language, I had to assess the perspective-taking skills of the participants. For this reason I used a Dutch translation (Duriez, 2004) of the *perspective-taking* subscale of the Interpersonal Reactivity Index (IRI) (Davis, 1980). IRI is a measure of individual differences in the personality trait of empathy, and it contains four independent subscales, corresponding to four

components of empathy. The *perspective taking* subscale consists of seven items, which “assess spontaneous attempts to adopt the perspectives of other people and see things from their point of view” (Davis, 1980, p. 85).

The translation was done according to the guidelines of the International Test Commission, with the translation back-translation procedure, while the final version was approved by a group of bilingual research assistants (Duriez, 2004). Internal consistency of the Dutch perspective-taking sub-scale was good ( $\alpha=.82$ ) (Duriez, 2004). The items of the scale are scored on a five-point rating scale.

## 2.4 Procedure

Participants were seated opposite a computer monitor in an isolated room, their hands placed upon a keyboard on a desk in front of them. Statements were presented to them word-by-word, in white fonts at the center of a black screen. Each trial started with the presentation of a fixation cross for 3000 ms, followed by a blank of 1000 ms, followed by the statement. Inter-word interval was 150 ms. The presentation duration of each word was equal to the number of its letters multiplied by 30 plus 290 ms, except for words of 10 letters or longer, which were always presented for 590 ms. The final word of each statement was presented for 1000 ms.

At the end of each statement a four-point scale appeared on the screen, and the subjects had to state their (dis)agreement by pressing one of two buttons to the left or right of the space-bar, corresponding to one of the four points of the scale depicted. Unlike in the original study, the scale was flipped during the experiment, meaning that in each trial the “agree” response might be either to the left or to the right end, and participants had to look at the scale displayed on the screen and give their response accordingly. The two possible orientations of the scale were equally distributed across the four conditions and pseudo-randomized.

The task started with a practice block of 12 trials. The real trials were divided into 6 blocks of 30, as each participant saw either the consistent or the inconsistent version of each experimental and control item. There were four different versions of the task, resulting from the combination of two mirrored presentation orders of the items with two mirrored scale-flips randomizations of each of the four (consistent/inconsistent x control/experimental) conditions. Nevertheless, no matter which version participants accomplished the pattern of the scale flip was the same. At the end of each block there was a pause of at least 30 s during which an animal picture was shown. After that period participants could decide when the next block starts, by pressing the space-bar. The task lasted approximately 45 min.

Once participants had accomplished the task, they filled in a number of questionnaires, containing both debriefing and the IRI questions<sup>1</sup>. The whole procedure –including the setup and the hair-washing– lasted approximately 2 hours and 15 min.

## 2.5 EEG Recording

EEG signal was recorded continuously from 64 Ag/AgCl pin-type electrodes, attached on an elastic cap (International 10-20 system). Six additional electrodes were attached on the left and right mastoid, on the left and right canthi and above and below the left eye. Signals were referenced on-line to the CMS/DRL electrodes and amplified with the ActiveTwo Biosemi amplifier (BioSemi B.V., Amsterdam, Netherlands; sampling rate: 2048 Hz; bandwidth: 417 Hz).

## 2.6 Data processing and Analysis

Before proceeding with the actual analysis, the EEG signal was re-referenced off-line to the mastoid average, and filtered with a 0.1 Hz low cutoff filter, a 35 Hz high cutoff filter and a notch filter at 50 Hz. After downsampling the EEG signal off-line to 256 Hz, data were segmented in epochs of 1000 ms, starting 200 ms before the critical-words onsets up to 800ms after it. This epoch width was chosen in order to minimize artifact rejection due to bad signal in the latencies preceding and following the ones I would actually use for the analysis. Baseline correction was applied on the basis of the 200ms prior to word onset. Segments containing signal that exceeded  $\pm 75\mu\text{V}$ , had a voltage step bigger than  $50\mu\text{V}$ , or was lower than  $0.5\mu\text{V}$  in intervals of 100 ms were rejected. Unlike in Van Berkum et al. (2009), participants were included in the analyses –both behavioral and EEG– only if after artifact rejection they had at least 20 good segments per condition. This tactic resulted in a final number of 30 participants, 24 female and 6 male (75% of the total).

As control sentences were not controlled for the (in)consistency of their meaning, inclusion of the responses to control statements in the behavioral analyses was meaningless. Furthermore, only responses at the extremes of the response scale (77,38%) i.e. extremely “agree” (N=950, 46.05%) and “disagree” (N=1113, 53.95%)

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<sup>1</sup>Along with *perspective taking* a number of other personality traits was also assessed by the use of other personality questionnaires: NEO-PI-R (Hoekstra, Ormel, DeFruyt, 2007), *Verbal aggression* subscale of the “Aggression Questionnaire” (Buss & Perry, 1992) and a scale of Dogmatism (Shearman & Levine, 2006).

were taken into account, as psychometrically more reliable. Two GLM repeated measures analyses were run for the number of the “agree” and “disagree” responses in the experimental statements, and for the corresponding response-times (RTs), with *agreement* (“agree”/“disagree”) and statement *consistency* (consistent/inconsistent) as within subjects factors. The GLM repeated measures model was also used for the EEG analyses with statement *consistency* and *type* (experimental/control) as within-subjects factors.

In order to test how the perspective-taking skills of our participants affected their responses, I split the subjects into three subgroups, according to the scores each of them obtained in the *perspective-taking* subscale. Only subjects classified in the two extreme subgroups –lowest and highest in perspective-taking– were included in the relevant behavioral and EEG analyses, in which group-membership (*perspective-taking*) was added as a between-subjects factor. The mean score in the perspective-taking subscale for the low-perspective-taking group was  $\bar{X}=19.1$  ( $\sigma=3.14$ ), while for the high-perspective-taking group it was  $\bar{X}=30$  ( $\sigma=2.58$ ). Each of the two subgroups consisted of 10 subjects, 2 male and 8 female, thus the differences between the two groups could not be attributed to the factor of sex.

### 3. Results

#### 3.1 Behavioral

In the EEG analysis I included trials regardless of the corresponding agreement-response they had attracted. Because of this methodological divergence from the original study, it was useful to check that even without taking into account the responses participants gave in each of the experimental trials, the “a priori” consideration of half of the statements as consistent and half as inconsistent with the ideology of the subjects was roughly valid. For this reason, I had to confirm that the number of extreme “agree” responses was bigger than the number of extreme “disagree” responses for the experimental consistent statements, and in any case higher than for the inconsistent ones. In the same lines, the number of extreme “disagree” responses within the inconsistent experimental condition should be higher than the number of extreme “agree” responses and the number of extreme “disagree” responses in the consistent experimental statements.

The results confirmed that participants agreed more with the experimental consistent ( $\bar{X}=30$ ,  $\sigma=5.4$ ) than with the experimental inconsistent trials ( $\bar{X}=1.6$ ,  $\sigma=1.8$ ) [ $F(1, 29)=818.6$ ,  $p<.0001$ ]. Reversely, they disagreed more with the inconsistent

( $\bar{x}=34.4$ ,  $\sigma=5.1$ ) than with the consistent trials ( $\bar{x}=2.7$ ,  $\sigma=2.8$ ) [ $F(1,29)=885.67$ ,  $p<.0001$ ]. This interaction between *consistency* and *agreement* [ $F(1,29)=1063.97$   $p<.0001$ ] was also in the direction of more “agree” ( $\bar{x}=30$ ,  $\sigma= 5.4$ ) than “disagree” ( $\bar{x}=2.7$ ,  $\sigma=2.8$ ) responses in the consistent condition [ $F(1,29)= 552.16$ ;  $p<.0001$ ] and more “disagree”

( $\bar{x}=34.4$ ,  $\sigma=5.1$ ) than “agree” ( $\bar{x}=1.6$ ,  $\sigma=1.8$ ) responses in the inconsistent condition [ $F(1,29)=1076.59$ ;  $p<.0001$ ]. Furthermore, there was a “disagree” bias as, overall, people gave more extreme “disagree” ( $\bar{x}=18.5$ ,  $s=.54$ ) than “agree” responses (15.8,  $s=.55$ ) in the experimental condition [ $F(1,29)=22.66$ ,  $p<.0001$ ]. Despite this overall effect of agreement, the significant interaction between consistency and agreement was in the expected direction, thus adding to the construct validity of the study.

As concerns average response times, they were not manipulated either by the condition ( $F(1,18)=.341$ ,  $p=.566$ ) or by the response given [ $F(1,18)=.698$ ,  $p=.415$ ]. Mean RT in the consistent experimental condition was  $\bar{x}=988.8$  ms for “agree” responses and  $\bar{x}=425.35$  ms for “disagree” responses. For the inconsistent condition “agree” and “disagree” RTs were  $\bar{x}=1252.53$  ms and  $\bar{x}=1024.52$  ms respectively.

An analysis of the RTs with respect to perspective-taking showed that mean RTs were comparable across the two perspective-taking groups. Neither an overall effect of perspective-taking [ $F(1,11)=.28$ ,  $p=.607$ ] nor any significant interactions including the perspective-taking factor were found [ $F(1,11)=.916$ ,  $p=.359$ , for perspective-taking x consistency;  $F(1,11)=.234$ ,  $p=.638$  for perspective-taking x agreement, and  $F(1,11)=.011$ ,  $p=.920$  for the three-way interaction].

### 3.2 EEG

As Figure 1 demonstrates, in the experimental condition people high in perspective-taking exhibited a larger positivity ( $+1.8\mu\text{V}$ ) from 200 to 450 ms after the onset of words that signaled a value-inconsistent statement, as compared to words signaling value-consistent statements [ $F(1,18)=9.43$ ,  $p=.007$ ]. This difference was “embedded” in a three-way interaction of type x consistency x perspective-taking [ $F(1,18)=9.62$ ,  $p=.006$ ]. A topographical representation of the grand averages waveforms, showed that the effect appeared in the anterior region. Thus, in the analysis I included all the electrodes anterior to the central line of electrodes delimited by the Cz electrode (FT7, FC5, FC3, FC1, FC2, FCz, FC4, FC6, FT8, F7, F5, F3, F1, F2, Fz, F4, F6, F8, AF7, AF3, AFz, AF4, AF8, Fp1, Fp2, Fpz).

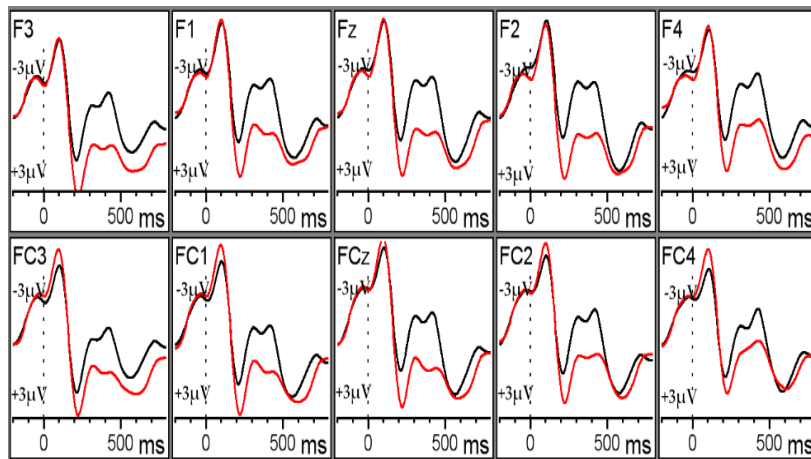


Figure 1a. Grand averages for the experimental consistent and inconsistent statements in the high-perspective-taking group. The two waveforms show the larger positivity in the inconsistent than in the consistent trials. For display purposes, all graphs and figures are based on data low-

pass filtered at 5 Hz.

### Value-consistent statements

### Value-inconsistent statements

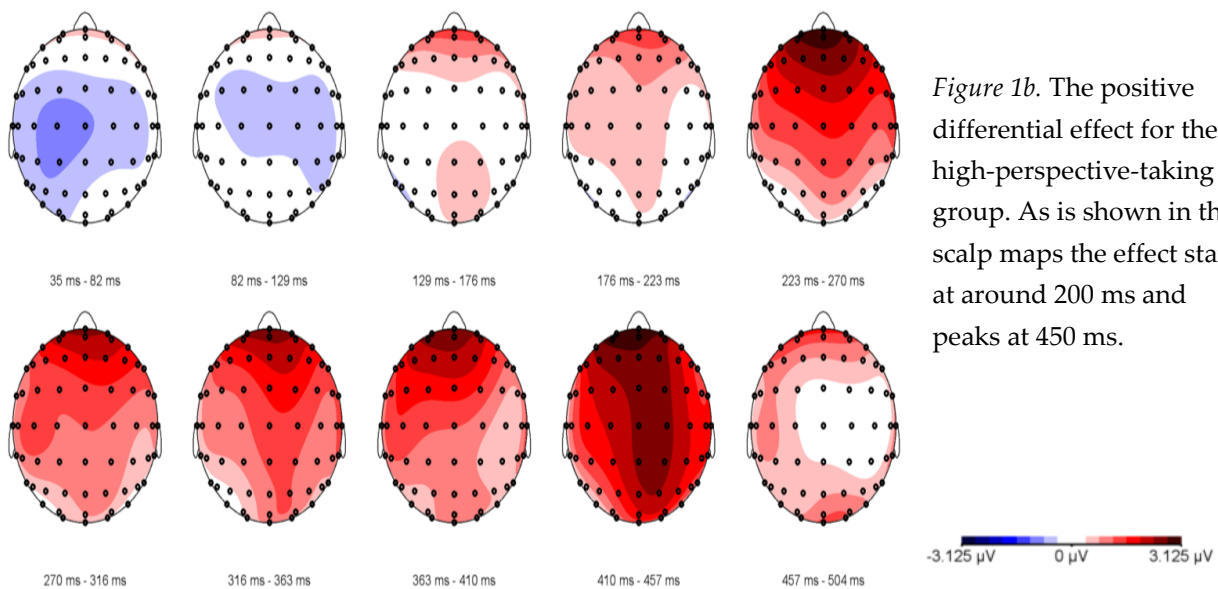


Figure 1b. The positive differential effect for the high-perspective-taking group. As is shown in the scalp maps the effect starts at around 200 ms and peaks at 450 ms.

The positive effect for the inconsistent statements only occurred for the *experimental* as opposed to control trials, since as predicted, responses to critical words of the control statements did not differ across the consistent and inconsistent conditions [ $F(1,18)=.116, p=.738$ ].

Furthermore, Participants low in *perspective-taking* did not display the analogous pattern, since their responses in the same region and latency range were not manipulated by the consistency of the statements they were to evaluate, neither for the experimental [ $F(1,18)=.116, p=.738$ ] (cf. Figure 2) nor, as expected, for the control ones [ $F(1,18)=2.43, p=.136$ ].



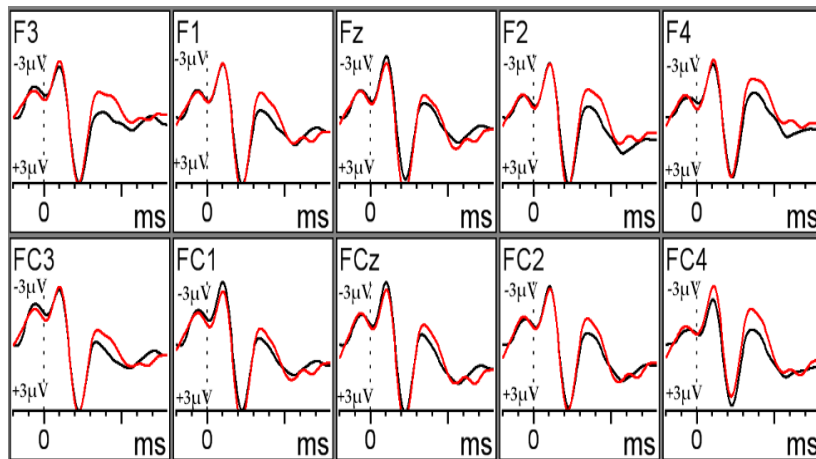


Figure 2a. Grand Averages upon critical words of inconsistent and consistent experimental trials for the low-perspective-taking group. No positive effect was found for the participants who scored low in the perspective-taking scale.

**Value-consistent statements**  
**Value-inconsistent statement**

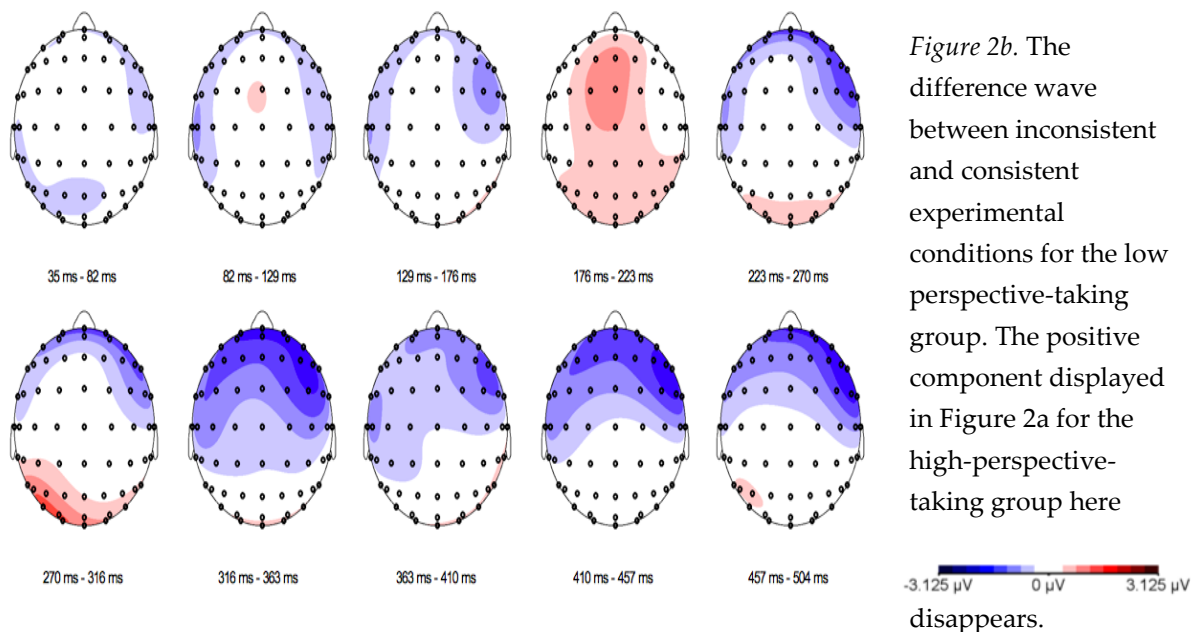


Figure 2b. The difference wave between inconsistent and consistent experimental conditions for the low perspective-taking group. The positive component displayed in Figure 2a for the high-perspective-taking group here disappears.

Interestingly, as depicted in Figure 3 in the overall sample the difference in the ERP patterns for the consistent and inconsistent experimental statements applying to the high-perspective-takers is attenuated. When I run the analysis for the whole population, without taking into account the perspective-taking skills of the subjects, no interaction of consistency x type existed [ $F(1,29) = 2.74$ ;  $p = .108$ ]. From Figure 3 it also becomes clear that none of the hypothesized effects found in Van Berkum et al. (2009) were detected overall in our sample.

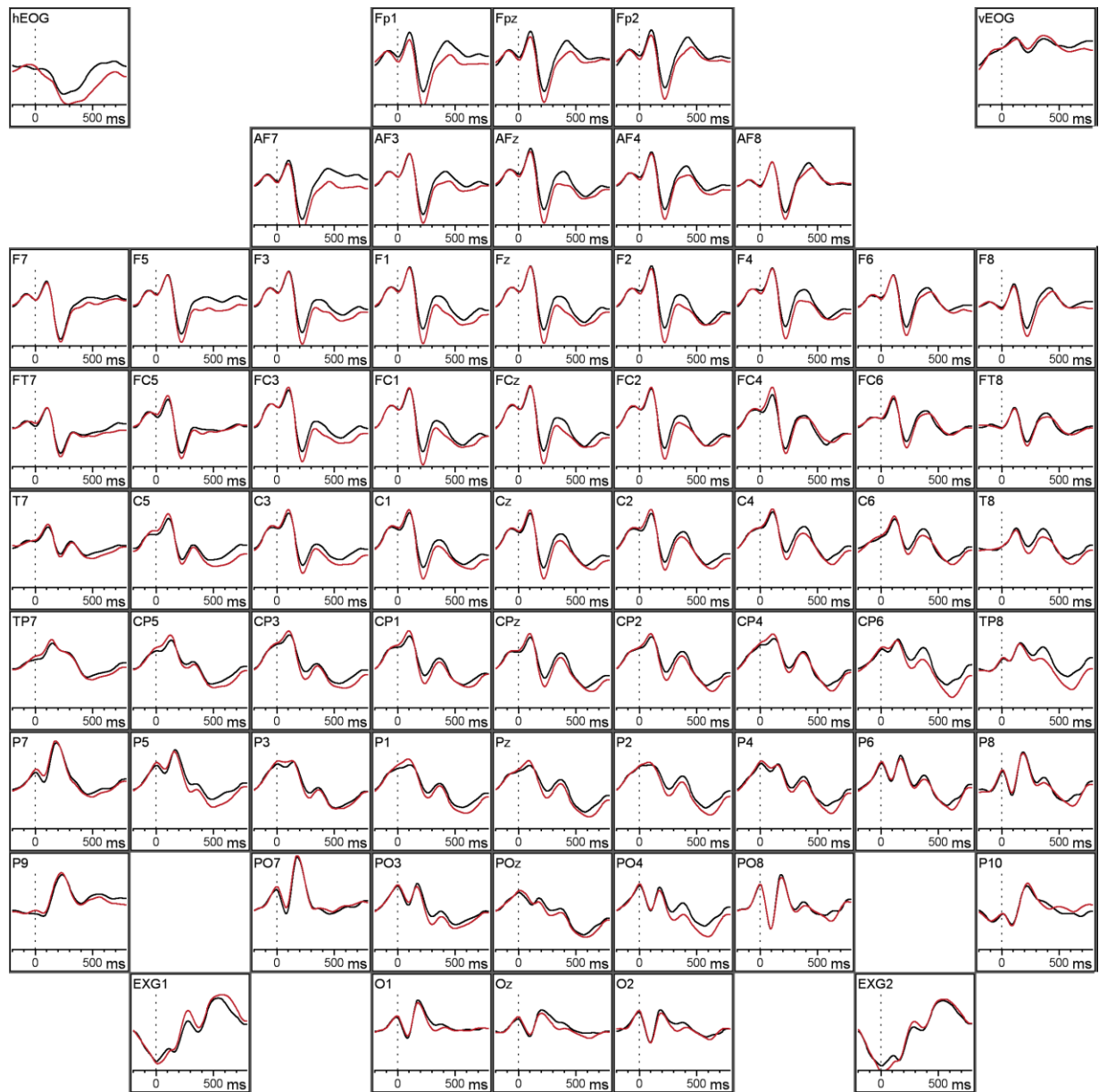


Figure 3. Topographical representation of the waveforms upon the inconsistent and consistent experimental trials for the whole group. No outstanding difference in the waveforms of the consistent and inconsistent trials, neither in the anterior nor in the posterior area can be detected.

Interactions of type  $\times$  consistency in the posterior area were non-significant for the 400-500 ms [ $F(1,29)=2.08, p=.160$ ], whereas, while for the 300-400 ms latency range the interaction was significant [ $F(1,29)=5.79, p=.023$ ], none of the four pairwise comparisons of *type* [ $F(1,19)=2.588, p=.118$  for the consistent statements;  $F(1,19)=.518, p=.477$  for the inconsistent statements] and *consistency* [ $F(1,19)=3.518, p=.071$  for the experimental and  $F(1,19)=1.347, p=.255$  for the control statements] were significant. The same holds for the 500-600 ms latency ranges [ $F(1,29)=1.13, p=.296$ ].

Crucially, the two *perspective-taking* groups did not display different reactions in the posterior regions for the consistent vs inconsistent and the experimental vs the control statements in the 300-400 ms [ $F(1,18)=0.458$ ,  $p=.507$ ] or the 400-500 ms latencies [ $F(1,18)=.299$ ,  $p=.591$ ].

In sum, no N400 effect was found either in the overall sample, or in the two perspective-taking groups. In the same way, no indications for an LPP effect either in the whole population or differentially in the two groups [ $F(1,18)=1.919$ ,  $p=.183$ ] existed in the 500-600 ms latency range.

## 4. Discussion

People who are characterized by high perspective-taking skills exhibit a positive ERP component upon reading of words that mark a statement contradicting their beliefs, in contrast to people who are less inclined to adopt different perspectives than their own. This component appeared at 200 ms and peaked at 450 ms after the words' onset, and was manifested in the anterior regions. This finding was unexpected and, thus I will account for it in a tentative manner. Before that, I am providing some contemplations on why the hypothesized effects were not found.

Although this study was a follow-up of Van Berkum et al. (2009) none of the effects found in that experiment were replicated here. Neither an N400 nor an LPP component was elicited by critical words of value-inconsistent statements. One reason for this discrepancy might be the slightly different analysis followed here. Although the behavioral results indicated that the agreement responses participants gave were in the expected condition-compatible direction, the fact that segments were included in the analysis irrespective of the particular agreement response they attracted might suggest that not all of them actually possessed the ideological status of the condition they were ascribed to. This mismatch is likely to have reduced the power of the design. A future agreement-consistent analysis might shed light on this possibility.

Another explanation is related to the different ages of the participants in the original and the present study. Given that participants in Van Berkum et al. (2009) were significantly older than the students that participated in the experiment at play, one could claim that older people may be more sensitive with respect to their own values than young students, and that this might be the reason why participants in the former study reacted to value-inconsistent statements in the way they did. Note however that Graham et al. (2012) who also used student participants *did* replicate

some of the results by Van Berkum et al. (2009). Thus, this explanation is only speculative.

Before advancing with an evaluation of the ERP effect found, I should first note that in an EEG analysis including the personality factor of *impulsiveness* –another personality sub-trait measured by the NEO-PI-R scale– instead of perspective-taking, a significant three-way interaction with the factors of *consistency* and *type* of the statements was also found [ $F(1,17)=4.78$ ,  $p=.043$ ]. Impulsiveness or impulsivity “can be defined as the tendency to deliberate less than most people of equal ability before taking action” (Dickman, 1990). The grand averages waveforms of the high and low-impulsiveness groups for the experimental consistent and inconsistent statements gave more or less the same pattern as the corresponding grand averages waveforms of the high and low-perspective-taking groups respectively. Pearson’s correlation coefficient was significant for the two traits ( $r=.520$ ) and as a matter of fact the two high and low groups shared half of their participants. These results point to the possibility that the findings concerning perspective-taking are actually an “impulsiveness confound”. Yet, two facts are in support of the claim that the anterior positivity is associated with the personality trait of perspective-taking. First of all, *impulsiveness* as lack of deliberation before action does not seem to be particularly meaningful for people’s reactions to ideologically inconsistent vs consistent statements. Secondly, the three-way interaction was smaller for impulsiveness than for perspective-taking. Thus, both conceptually and statistically speaking it is more proper to consider the trait of perspective-taking as related to the ERP patterns presented in the present experiment. Needless to say that future research is expected to shed light in the above personality-traits correlation.

#### 4.1 The “positivity” effect

Since the effect found around 200-450 ms in the high perspective-taking group doesn’t match any of the components reported in the literature to reflect people’s reactions to value-laden statements, we cannot be sure about its nature. In this section, I show the way to some plausible interpretations.

First of all, this effect appeared in participants that have a strong capability of adopting other people’s perspectives, but not in people whose score in this trait is low. As a consequence, it can be claimed to be particularly related to the perspective-taking trait. Secondly, as it set apart value-inconsistent and value-consistent

statements, it points to different reactions towards the two kinds of statements, as modulated by the degree of perspective-taking.

Viewed under the lenses of *Moral Foundations* theory these results have interesting implications. As noted in the introductory section, according to the *Moral foundations* theory, liberals mainly endorse values related to the care/harm and fairness/cheating foundations. “Care/harm foundation covers basic concerns about the suffering of others, including the compassion and care (...)”, while “fairness/cheating covers norms of reciprocal relations, equality, rights, and justice(...)” (Graham et al., 2012, p. 4). Norms of rights, justice and equality in this case are intended in the Kohlbergian sense, meaning they are considered to be acquired by individuals after sufficient exposure to relevant democratic institutions, and, critically, through the practice of role-taking (Haidt & Graham, 2007). In this view, the value of fairness seems to be tightly connected to the ability of perspective-taking, in a way that the latter is a prerequisite for the former, and in any case proportional. As for the links between the personality trait of perspective-taking, especially given its quality as a component of empathy, with care about others and compassion, it is self-evident. If the degree to which people rely on foundations of *care* and *fairness*, the two basic foundations of the liberal ideology, is determined by their ability to take the perspectives of others, then scores in the perspective-taking subscale in the present experiment can be taken to represent scores in “liberalism”. In short, participants assessed to have higher perspective-taking abilities might just be “more liberal” than the ones scoring lower in this trait. If this is so, then the ERP patterns of high perspective-takers can be taken to reveal a positivity effect triggered by value-inconsistent statements, in an analogous way that the LPP and N400 effects have been related to such statements: as revealing some sort of “ideological” annoyance.

In a slightly different line of argumentation, the liberal morality has been claimed to be a layered system, with frequent discordances between explicit and implicit values. For example, Skitka, Mullen, Griffin, Hutchinson, & Chamberlin (2002) claim that a major difference between the liberal and conservative ideology is *motivated correction*, the tendency on behalf of liberals to correct spontaneous attributions that they otherwise share with conservatives. Similarly, the “Warning Bell” assumption by (Graham et al., 2012) points to a marginally conscious, and in any case higher-level suppression of intuitive moral judgments concerning the loyalty, authority and sanctity foundations on behalf of liberals. Such approaches designate the liberal value-system as resulting from the combination of “raw” subconscious moral reactions with higher-order and at times contradictory deliberate

cognitive processes. Then, a related reasonable assumption is that liberals with high perspective-taking skills will be faced with moral or ideological contradictions to a higher degree than liberals with lower perspective-taking skills, because these people are more prone to cognitive conflicts between “desired” values on the one hand, and intuitive moral reactions on the other. Even more so that perspective-taking itself is considered to be a phylogenetically and ontogenetically secondary characteristic (de Waal, 2008). In other words, there might be a more pronounced “conflict” in the ideological or moral cognition of liberal people high in perspective-taking, resulting from their tendency, capacity or will to exert control to their moral but also general reactions. Thus, in the present study, the effect that appeared in this group could also be considered as a positive component that betrays intrinsic moral or political correction, or a more general conflict between implicitly and explicitly endorsed moral values during processing of value-inconsistent statements.

Now as already mentioned, RTs did not differ across consistent and inconsistent experimental statements as a factor of perspective-taking. This would be contradictory to an interpretation in which our effect reflects an on-line “conflict” that should, thus, be detectable in different RTs for the consistent and inconsistent statements. Yet, in the claim being made here, it is not implied that the tension between explicit and implicit morality should be viewed as an on-line continuous “fight”. It would be somewhat unorthodox to propose that people with great perspective-taking skills are faced with higher-order consciously-derived conflicts every time they encounter a morally-relevant issue. The focus of this interpretation is more on a different *structural organization* of beliefs and values in people with an accented perspective-taking ability. In which case, the above-posed conflict has been *inscribed* in the value-system rather than occurring on-line every time these people have to deal with ideologically-relevant issues. In these lines, the effect found here can be taken as a positivity reflecting the processing of value-inconsistent statements as evaluated against a value-system with inherent conflicts between implicitly and explicitly endorsed values. The nature of such an interaction, and the question of why intrinsic conflicts of a value-system would be selectively brought on the surface by *value-inconsistent* statements are issues that should be furthered explored.

## 5. Conclusion

This study was an attempt to add to the currently limited number of works on ideology in relation to language processing. Unlike in the previous studies, the approach here was delimited by a personality factor, that of perspective-taking, as

likely to affect processing of ideologically-loaded statements. The results, suggestive rather than conclusive, indeed point to a modulation of the processing of ideological statements by the personality trait of perspective-taking, as the ERP effect found was specific to people with high perspective-taking skills. Although, in lack of relevant previous literature, the nature of this effect could not be soundly interpreted, I hope that the previous section incited some interesting issues.

One thing to keep in mind is the possibility that this effect reflects the particular cognitive organization of a multilayered and intrinsically conflicting belief-system –such as the one of people with great perspective-taking skills– when this system is called on to check the “correctness” or “incorrectness” of value-laden statements. This possibility puts forward new perspectives in the study of language processing and communication, as it affirms the multi-faceted way in which these functions are affected by several factors. In this study, personality was found to interact with people’s system of beliefs while they read and evaluated ideologically-loaded statements. If we move in a setting of face-to-face communication, innumerable other factors enter the arena of language processing. An interesting one that might even enrich the interpretation of the effect found here, especially in view of the specific perspective-taking personality trait, is the identity of the interlocutor. The first study described in the introductory section, already hinted to this factor as jointly interacting with ideology during language –higher-order– processing. Further research will hopefully address such issues, enriching our idea of what “language in context” *really* means.

My final point concerns a slightly different field of research. Interestingly, the present results also apply to studies of social and moral cognition, as they indicate that the general distinction between “liberals” and “conservatives”, upon which many of these studies are based, seems to be in need of refinement and enrichment. In the present study a single group of liberal participants was split and “dichotomized” as for their reactions to ideologically invested language, based on a factor other than ideology itself. This means that if, as the *Moral Foundations* theory aims, we want to trace the sources of moral conflicts between partisans (Graham et al., 2012) it does not suffice to decode the content of people’s value-systems. We should also explore how further distinctions between people might pattern with differential moral and ideological cognitive operations. The present results already pointed to the impact of perspective-taking on the way people process value-laden statements. Hopefully, in the future, other personality traits will also turn out to be relevant.

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