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## Cognitive continental drift: how attitudes can change the overall pattern of cognitive distances

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**Abstract.** By the late Carboniferous period, the continents that today make up North America and Europe collided with the southern parts of Gondwana to form the western half of the last supercontinent Pangea. From this moment on, North America and Europe have steadily been drifting apart, as was initially described by Alfred Wegener in 1915. In this paper a cognitive counterpart of this continental drift is described—which progresses much faster than the phenomenon of plate tectonics. Distance estimations between cities of Europe and the USA were strongly modulated by an interactive effect of the social attitude towards the Iraq War in 2003 and towards US citizens in general, letting America and Europe drift apart hundreds of kilometers for those who disliked the war but were meanwhile sympathetic to US citizens. Possible implications for the relationship between Europe and the US are discussed and perspectives for a cognitive rapprochement of Europe and the USA are provided.

### Introduction

By the late Carboniferous period, the continents that today make up North America and Europe collided with the southern parts of Gondwana to form the western half of the last supercontinent Pangea. From this moment on, North America and Europe have steadily been drifting apart, as was initially described by Alfred Wegener in 1915 (see Wegener, 1929). I will demonstrate a cognitive counterpart of this drift: ‘cognitive continental drift’, which, progressing much faster than the geological phenomenon just described, makes the American and European continents drift apart hundreds of kilometers due to social attitudes.

### Physical versus cognitive distances

We regard distances as isometric entities, as direct measures of the physical ‘truth’ [eg the air distance between New York City (NYC) and Paris is 5850 km = 5850 000 times the distance travelled by light in absolute vacuum in 1/299 792 458 of a second]. Yet, when asked about distances in real life, people neither possess an absolute reference frame nor have reliable knowledge about concrete distances, so they have to *estimate* such distances. Cognitive distances are defined as “people’s belief about distances between places in large-scale spaces which are not visible from each other” (Montello, 1991, page 101) and rely on a variety of different sources of information (Tversky, 1992). The mental configuration emerging from the interrelation of these distances is called a ‘cognitive map’, a term coined by Tolman (1948) originally to describe the survey-like knowledge acquired by rats in maze-learning experiments. Cognitive maps can be developed and generated by different sources of information. Primary sources are: (a) navigating through a real or virtual environment (Richardson et al, 1999); (b) verbal descriptions of spatial relations, usually presented serially and analytically (Uttal et al, 2006); and (c) exposure to geographic maps that depict all spatial relationships in a holistic way (Maceachren, 1991). In real life we often use a combination of these sources of information (Bunch and Lloyd, 2006)—for instance, we look at a map when starting a tour and then explore the environment while driving and

simultaneously or ultimately we ask people at the roadside who seem to be familiar with the environment for help when we are lost.

### **Cognitive maps**

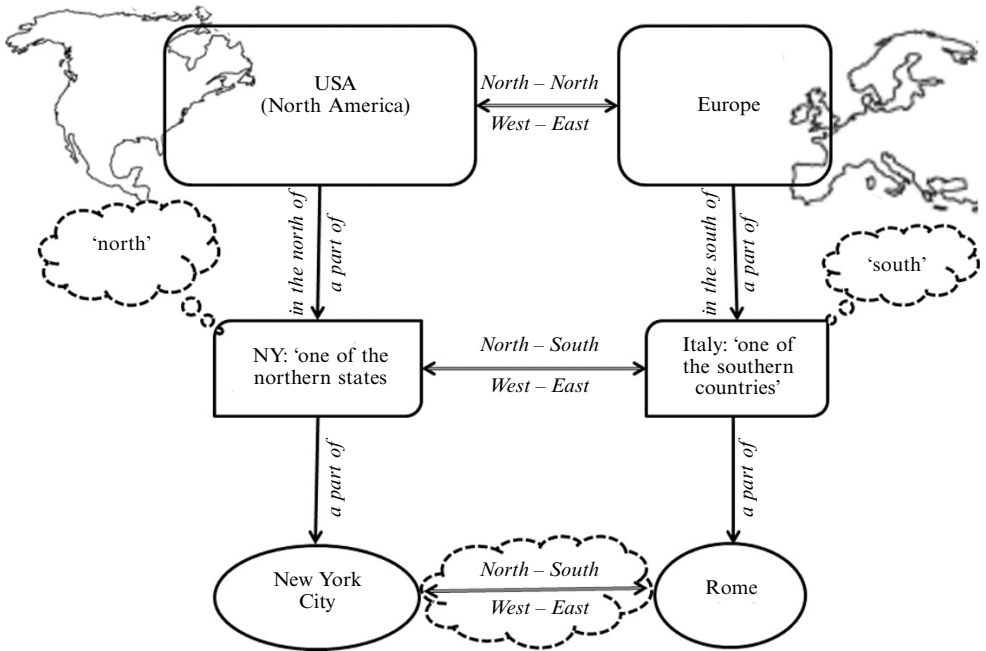
The essential function of a cognitive map is to help in navigating an environment, to optimize routes, and to get an overview of target positions. Consequently, an undistorted projection would be highly beneficial, but in the cases of neither geographic nor cognitive maps is this goal fully achievable. In geographic maps specific distortions arise by projecting locations situated on a spherical surface onto a flat map; in cognitive maps distortions arise by storing locations in a cognitively processable format that is neither image like nor propositional (Tversky, 1992).

Research on cognitive maps has identified characteristic distortions on different levels, ranging from more general distortions to distortions generated by social attitudes.

General distortions based on general perceptual and conceptual reorganization factors are found, among others, for the following cases: areas of maps which are nearly symmetrical are transformed into fully symmetrical ones (Freyd and Tversky, 1984), and geographical borders or topographical lines are reoriented towards cardinal directions such as 'north–south' or 'horizontal' even if they systematically deviate from these orientations (Tversky and Schiano, 1989). Such distortional factors are based on generally operating Gestalt principles (Wertheimer, 1938) for the encoding process as well as for the retrieval process. Stevens and Coupe (1978) revealed systematic distortions in assessing the geographical relations between two locations which belonged to different hierarchical units. Such hierarchical factors can emerge from political systems containing different levels of affiliations: national, ethnic, or geographical units. This can be demonstrated by cognitive distortions of the latitudes on which Rome and NYC are located. As Europe and the USA are thought to be found at comparable latitudes and Rome is a city which is located very much in the south of Europe, and NYC belongs to 'one of the northern states', Rome is typically estimated as being south of NYC. The opposite, however, is true. As illustrated in figure 1, we store location information about 'subordinate'<sup>(1)</sup> structures, such as regions or cities, mainly as relative positions within the respective 'superordinate' structure (eg 'Italy in the south of Europe', 'NYC in the north of the USA'). Spatial relations between subordinate structures, in contrast, have to be inferred from a combination of information about the relations of superordinate structures (Europe versus USA) and the relations of the subregions (Rome, Italy—'one of the southern countries' versus NYC, New York—'one of the northern states') within their respective superordinate structures.

Not only the relations between locations, but also the possibility of accessing locations at all, is a matter of cognitive heuristics. Friedman and colleagues found that relative prosperity, population density, and availability of locations (eg triggered by mentioning this location in the media) are good predictors for recognizing locations (Friedman and deWinstanley, 2006). Another important predictor for cognitive distance is the connectivity of locations. Thorndyke (1981) showed that cities that are directly connected by a route are judged closer than cities lacking such a direct connection (see also Klippel et al, 2004). This finding is in accord with my recent findings (Carbon, 2007)—I analyzed cognitive distances which were comparable with respective distances extracted from prominent highway structures such as the German autobahn system, despite participants being explicitly instructed to base

<sup>(1)</sup> Subordinate structures are defined as highly specified structures which are a part of the whole related theory of sets. Examples from domain of object recognition would be: 'this object is a BMW 730i' for subordinate processing instead of 'this object is a vehicle' for superordinate processing.



**Figure 1.** Illustration of hierarchical factors in estimating locations of cities. We know that the USA (North America) is west of Europe and we believe that both areas are situated at approximately the same latitudes. Our hierarchically organized knowledge tells us that, for instance, New York city (NYC) belongs to the state of New York, commonly known as ‘one of the northern states’, as the state of New York is per definition located in the north. Rome, in contrast, is the capital of Italy which is a southern country in Europe (parts of Italy are approximately at the latitude of some locations in Africa). As most people have no direct knowledge about the concrete spatial relationship between NYC and Rome, we infer it from the relations of the superordinate structures leading to the incorrect conclusion that NYC (located on latitude  $40^{\circ} 43' N$ ) is north of Rome located on  $41^{\circ} 54' N$ .

their estimations on direct air distances (‘as the crow flies’). Other influences are national (Burris and Branscombe, 2005) or regional borders (Friedman and Montello, 2006) which enlarge distances towards cities behind these borders, partly caused by culture-specific knowledge (Friedman et al, 2005) and *nation centrism* (Kerkman et al, 2004). Mark (1992) assumed weather and climate factors as additional predictors for latitude estimations, an assumption further validated by recent data from a study in China (Xiao and Liu, 2007). Xiao and Liu also demonstrated that cities within the same dialect region are estimated to be closer and a kind of dialect barrier is found between different dialect regions extending the cognitive distances between cities originating from different dialect regions.

The psychological question implied by such results is: what could be the benefit for humans of using cognitive heuristics instead of exhaustive analyses based on hard data? Pioneering ideas on cognitive heuristics by Tversky and Kahneman (1974) state that people rely on very few heuristic principles enabling them to reduce cognitive complexity. This helps to increase the speed of processing and reduces the cognitive effort for such processes. Cognitive heuristics are often found to work quite automatically, much like highly automated daily procedures such as car driving or opening an envelope, with hardly any cognitive effort. In standard situations this helps to minimize ‘cognitive load’, which increases the probability of processing success and gives the opportunity to process parallel tasks. However, the more deviate from

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standard the given situation is, the more problematic heuristics can be, as they lead to systematic errors. The above-mentioned example of dislocating Rome as more to the south than NYC on the basis of heuristics from alignment of the hierarchically higher structures and climatic knowledge (Rome is warm, therefore in the south; NYC is mild and cold, therefore in the north) shows how much impact such a heuristic can have on location tasks.

In a series of experiments Friedman and colleagues (Friedman and Brown, 2000; Friedman et al, 2002) have demonstrated that such heuristics can work in a very dynamic way. People combine information from an item level (city location) or category level (country location) and continuously update this information by integrating new information. Interestingly, this update process does not linearly improve the accuracy of the cognitive map but, due to the heuristic nature of cognitive maps, a single concrete position of one city can change the whole setup. Friedman and Brown (2000) refer to this phenomenon as “psychological plate tectonics” (page 218), a term that underlines the power of singular psychological factors in biasing and generating cognitive maps.

#### **Attitudinal factors for biasing cognitive maps**

In a seminal paper Ekman and Bratfisch (1965) revealed a further source of bias. Within a simple distance estimation task for ten intercity distances with Stockholm as epicenter, the authors demonstrated a direct relationship between emotional involvement and cognitive distances. Although their database was rather sparse, they were able to propose an inverse relationship between emotional involvement with given cities and the distances towards them. More recent research taking into account a greater variety of distances again demonstrated attitudinal factors as the basis for biases in cognitive maps. Kerkman et al (2004) showed that ‘diversity orientation’ (an attitudinal dimension defined as ‘positive disposition toward other peoples and places’) leads to a reduction of cognitive distances to distant cities in Mexico and Canada from a US-based center.

Ekman and Bratfisch’s paradigm was further employed by Carbon and Leder (2005) to test the relationship between Germans’ social attitudes and their cognitive distances across the former Iron Curtain. In social psychology it is well known that social attitudes [for problems of assessing attitudes, see Gawronski (2007)] are key factors in predicting human behavior (Harvey, 1970). My and my colleague’s (Carbon and Leder, 2005) rationale was the following: when people have a negative attitude towards a specific country, region, or a city, the estimated distance towards this location should be overestimated compared with locations of the same physical distance but with a better ‘reputation’. Touchstone was the attitude of Germans towards German reunification in 1990. For participants who have a negative attitude towards the reunification, cities of the other part of Germany, formerly situated on the other side of the Iron Curtain, should be estimated farther away than cities at an equal distance within the same part of Germany. The data did validate this hypothesis by revealing an inverse relationship between the attitude towards German reunification and distance estimations: the worse the attitude towards German reunification, the stronger the overestimation of distances between cities of West and East Germany. We termed this effect a ‘mental wall’ which is modulated by social attitudes.

In conclusion, cognitive and emotional factors such as social attitudes can strongly bias cognitive maps.

### The present experiment

In 2003 US and allied forces started the Iraq War, also known as the ‘Second Persian Gulf War’ ‘invasion of Iraq’, ‘occupation of Iraq’, or the military operation with the code name ‘Operation Iraqi Liberation’. The Iraq War polarized the world—with strong criticism raised by European governments, especially by French-speaking and German-speaking countries—resulting in Anti-American and Anti-British demonstrations worldwide (Forsberg, 2005; Gordon, 2003; Howorth, 2003), and finally leading to attitudes against the war and against countries involved in the war. Antiwar attitudes increased even more after false assertion was unveiled as justification for the war suggesting that the Iraq War had served only as a proxy for ulterior interests and conflicts.

The following experiment is aimed at investigating whether attitudes towards the Iraq War do have the power of changing cognitive maps. On the basis of the rationale of mental walls (Carbon and Leder, 2005), which are modulated by social factors, people with a strict negative attitude towards the Iraq War were expected to systematically overestimate distances between Europe and the USA compared with people who do not have such a negative attitude. Note that, as attitude towards the Iraq War is not directly linked to attitude towards Americans, the USA, or the relationship between Europe and the USA, this experiment provides an essential check as to whether the theory of mental walls is a mere artifact caused by demand characteristics or whether it is appropriate for implicitly assessing social attitudes via cognitive maps. To control for any effects for attitude or sympathy towards or for US citizens as such, we also included this attitude variable in our test design.

## Experiment

### Method

#### *Participants*

Some 224 volunteers, randomly chosen from a subject pool database (VPMS, Versuchspersonen-Management-System) established at the University of Vienna, from the greater Vienna (Austria) area (154 female) volunteered for partial course credit. The mean age was 34.4 years, ranging from 18 to 76 years. Two participants were excluded due to meaningless and repetitive estimations—for instance, a series of ‘56’ or ‘67’ estimations for trans-Atlantic distances in kilometers. Two further participants had to be excluded as they missed answering the questionnaire on attitudes after the experiment. Concerning the focused variables of social attitudes (attitude towards the Iraq War, attitude Iraq War, and whether US citizens are liked in general, attitude US citizens) we obtained the following distribution: of the analyzed 220 participants, 135 (61.4%) showed a negative attitude towards the Iraq War, and 87 (39.5%) reported a positive attitude towards US citizens in general. Both variables cross-yielded the following distribution (see table 1).

**Table 1.** Distribution of the parameter values attitude Iraq War and attitude US citizens among the participants.

US citizens	Iraq War	
	positive	negative
Positive	37	50
Negative	48	85

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### *Stimuli*

Six European cities (Berlin, London, Madrid, Paris, Rome, Zurich), six US cities (Chicago, Houston, Los Angeles, NYC, Miami, Seattle), and Baghdad were used as cities of interest. European and US cities were selected due to two premises: (1) high familiarity ratings on the basis of a prestudy in which 149 participants had to evaluate familiarity with 112 cities all over the world on eleven-point rating scales from 0 (unfamiliar) to 10 (highly familiar); and (2) a large spatial spread across the USA and Europe.

### *Procedure*

Participants were individually asked to estimate the distances between all thirteen given cities for both possible directions—for example, Berlin to NYC and NYC to Berlin, on the basis of air distances (as the crow flies) (Wender et al, 1997)<sup>(2)</sup> in kilometers. All in all, they had to estimate  $13 \times (13 - 1) = 156$  (unidirectional) distances. The order of trials was pseudorandomized in four different orders which were randomly assigned to the participants. After having completed the distance estimation task, they were asked several questions regarding their attitudes towards the Iraq War and towards US citizens in general on seven-point rating scales from 1 (fully negative) to 7 (fully positive), several security issues of the USA, Europe, and the world, the role of the US in the Iraq conflict on seven-point rating scales from 1 (fully disagree) to 7 (fully agree), and a question concerning their geographical knowledge on a seven-point rating scale from 1 (very bad) to 7 (very good). The whole procedure lasted about 30 minutes.

### **Results and discussion**

A  $p$ -value of 0.5 was used as significance level. First it was assessed whether the direction of the asked distances affected the estimation. Therefore, corresponding distances were tested via a dependent  $t$ -test for paired samples. For the forty-two city pairs where European cities were involved to assess a criterion of well-defined directions (from or to Europe—for example, Berlin to NYC and NYC to Berlin), no directional effect was found [ $t(41) = 1.3$ ;  $p = 0.1871$ , not significant;  $R^2 = 0.978$ ]. Consequently, estimated distances of unidirectional distance targets were aggregated for corresponding bidirectional distances (eg Berlin to and from NYC). The range of valid distances was set to 100–28 000 km. All remaining distances were further analyzed for outliers by including only those distances that were within the range of  $\pm 3.5$  standard deviations around the overall mean of all participants' estimations of the regarding distances. This two-step procedure resulted in a drop of 4.1% across all data.

The data were analyzed 'by distances' focusing mainly on 'across' distances (distances between cities, where one city is located in Europe and the other in the USA) and 'within' distances (distances between cities located on one continent, Europe, or the USA) due to a much lower  $n$  of city pairs for the other distance types. Social attitude data were dichotomized into positive versus negative attitude towards the Iraq War and US citizens. If social attitude towards the Iraq War, as expected, mainly influences across distances following the idea of mental walls, larger effects for across than for within distances were expected. To control for more general effects of attitudes towards US citizens, this additional attitude variable was added to the following analyses.

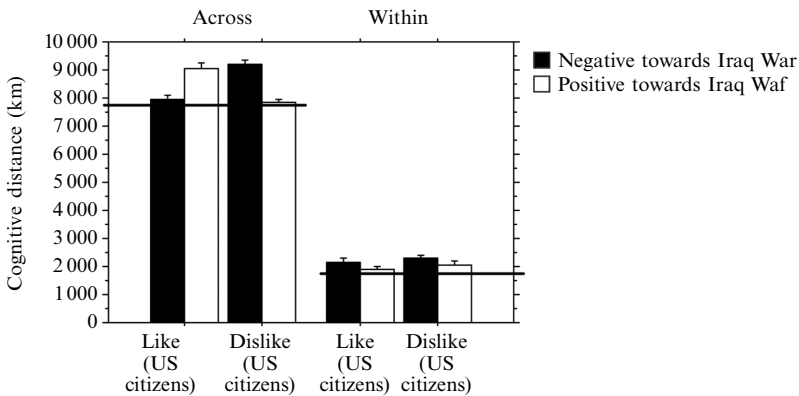
First, the effect of social attitude towards the Iraq War will be tested by employing an analysis of variance (ANOVA) where *across* and *within* cognitive distances were submitted to a mixed-design ANOVA with the between-case factors distance category (across versus within) and the within-case factors attitude Iraq War (negative versus

<sup>(2)</sup> It is of essential importance to instruct participants clearly on which basis they have to estimate distance, because route distances and direct (air) distances are assessed differently (Thorndyke and Hayes-Roth, 1982).

positive towards Iraq War) and attitude US citizen (negative versus positive towards US citizens in general). Second, the mainly focused across distances will be tested by regression analyses for each attitude group separately.

### Analysis of variance

Estimated distances data were submitted to a mixed-design ANOVA with the between-case factor distance category and the within-case factors attitude Iraq War and attitude US citizen as described in detail above. The highest level interaction effect was found between all three included factors ( $F_{2,75} = 288.5$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.885$ ), indicating differential distance estimations for across and within distances for the different attitudinal groups. Figure 2 shows this highly interactional pattern of results: whereas, within distances were similarly overestimated for participants who liked and disliked US citizens when the attitude towards the Iraq War was negative, there was a disordinal (cross-over) interactive overestimation effect for across distances.

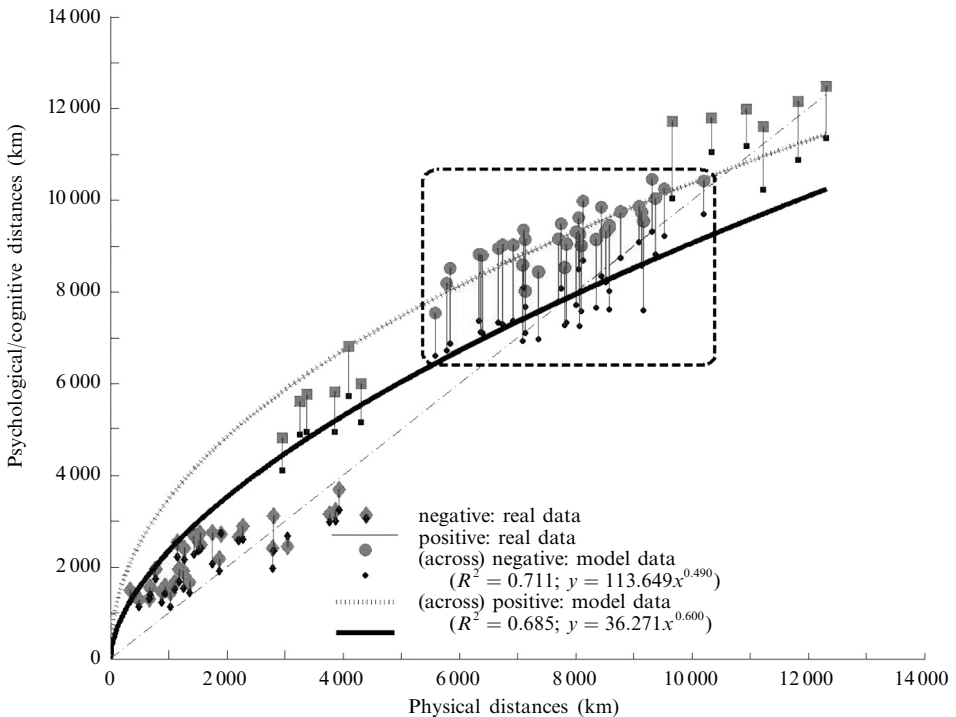


**Figure 2.** Mean cognitive distances split by distance type across versus within for the  $2 \times 2$  attitude levels (attitude towards the Iraq War and attitude towards US citizens). For reasons of referencing, mean real distances for the across and within distance types are given by solid horizontal lines.

To further investigate the two differential resulting patterns of data, two ‘reduced’ ANOVAs were conducted, one for the across distances, the other for the within distances. Again, as between-case factors the  $2 \times 2$  attitude groups were used. For the across distances a very large interaction effect between both attitude groups ( $F_{1,35} = 1019.3$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.967$ ), and a main effect of attitude Iraq War ( $F_{1,35} = 10.9$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.237$ ) (mean distance estimation,  $M_{\text{positive}} = 8250.0$  km versus  $M_{\text{negative}} = 8650$  km), were revealed. In contrast, for the within distances no interaction effect was reported, though both attitude effects were found significant: attitude Iraq War ( $F_{1,29} = 59.5$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.672$ ) ( $M_{\text{positive}} = 1987.4$  km versus  $M_{\text{negative}} = 2251.5$  km), and attitude US citizens ( $F_{1,29} = 19.9$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.408$ ) ( $M_{\text{like}} = 2051.5$  km versus  $M_{\text{dislike}} = 2215.1$  km). As within distances consisted of within distances originating from Europe as well as the USA, an additional ANOVA was carried out by adding the between-case factor continent (Europe versus USA)—this was done to be able to test for dissociate effects for both continents. Besides similar effects for the two attitude groups—attitude Iraq War ( $F_{1,28} = 80.4$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.742$ ) and attitude US citizens ( $F_{1,28} = 24.4$ ,  $p < 0.0001$ ,  $\eta_p^2 = 0.466$ )—both two-way interactions between continent and attitude Iraq War ( $F_{1,28} = 11.2$ ,  $p < 0.0024$ ,  $\eta_p^2 = 0.285$ ) and continent and attitude US citizens ( $F_{1,28} = 24.4$ ,  $p < 0.0105$ ,  $\eta_p^2 = 0.212$ ) were significant. When taking simple main-effect analyses of both attitude groups for separate continents into account, much weaker effects were obtained for the USA compared with Europe: attitude Iraq War ( $\eta_p^2 = 0.361$

versus 0.730) and attitude US citizens ( $\eta_p^2 = 0.212$ , not significant versus 0.514). This indicates that distances within the USA were only mildly or not at all biased by both attitudes in mind.

To sum up these results, when participants were against the Iraq War, within distances were much more strongly overestimated when they referred to Europe. For across distances a more complex pattern of results emerged: participants who had a negative attitude towards the Iraq War were only then overestimating across distances when they also disliked US citizens in general. This effect was inverted for participants who liked US citizens. This interaction is quite important for further differentiating and identifying attitudinal factors distorting cognitive maps (Carbon, 2007; Carbon and Leder, 2005; Kerkman et al, 2004). The attitude towards the Iraq War can have a variety of sources and can be based on different rationales. For instance, an antiwar attitude can be based on a more general anti-US sentiment linked to compatible negative attitudes in the present study. An antiwar attitude might also be raised by a more complex pattern of attitudes. If one is generally positive towards the US but rejects the idea of a war initiated by the US, an interesting state of mind with conflicting attitudes arises. Within the theory of mental walls, Carbon and Leder (2005) proposed that systematic overestimations of distances indicate mental walls between cities, regions, or nations. However, what we can reveal for persons with such conflicting attitudes is a kind of ‘inverted mental wall’ of substantial size. To further assess this complex interplay and to deepen the



**Figure 3.** Illustration of the mental wall for the participants with a negative attitude towards US citizens by means of regression analyses with power functions. The  $x$ -axis represents physical air distances, the  $y$ -axis psychological/cognitive distances (both in km). Large points and small points show empirical data for participants with a negative or positive attitude towards the Iraq War, respectively: circles show across distances, diamonds show within distances, and squares show distances to Baghdad. Curves are fitted only to the across distances (which are also framed by the dashed rectangle).

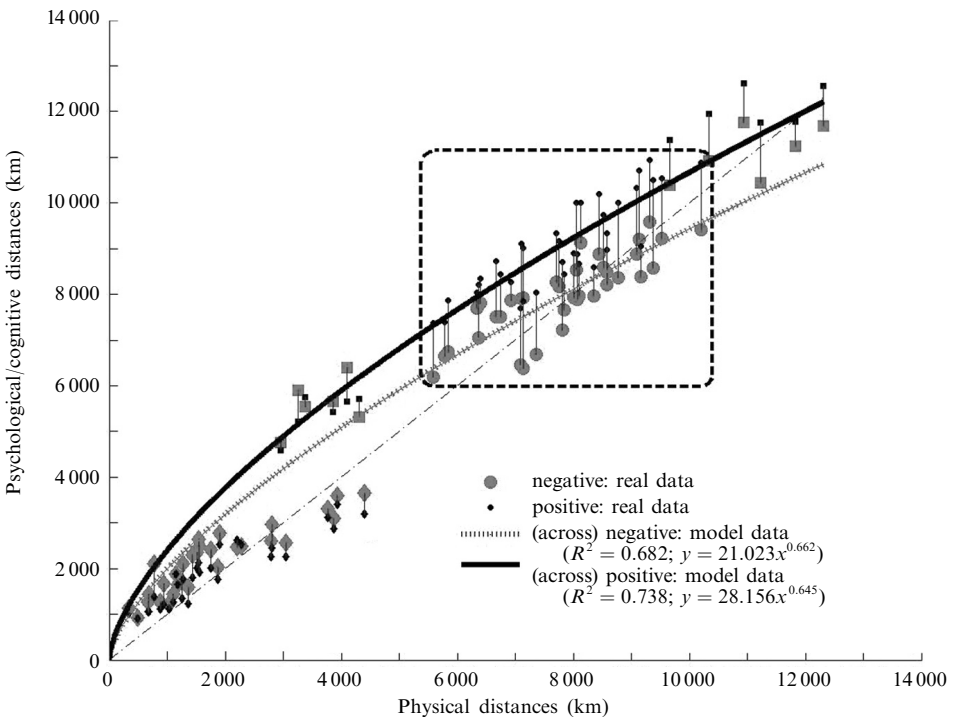


understanding of attitudinal effects on cognitive distances, additional regression analyses were carried out.

### Regression analyses

To investigate the dissociate distance estimation effect of across distances for the different attitude US citizens groups,  $2$  (attitude US citizens)  $\times$   $2$  (attitude Iraq War) regression analyses were conducted with physical air distances as predictors and estimated across distances as the dependent variable. Following the idea of Stevens and Galanter (1957) and on the basis of further empirical findings on cognitive distances (eg Ekman and Bratfisch, 1965) [see, for a critical analysis of the usage of power functions, Friedman and Montello (2006); Thorndyke (1981)], estimated distances were fit by power functions of the type  $y = ax^b$  ( $y$  is the estimated, cognitive distance;  $a$  is the  $y$ -intercept at  $x = 1$ ;  $x$  is the physical distance;  $b$  is the slope of the function).

All  $2 \times 2$  models fitted to medium-high degree within a range of  $R^2 = 0.682$ – $0.738$ , which is similar to previous studies (eg Friedman and Montello, 2006). As shown by the ANOVA above, the typical effect for a mental wall between participants being negative versus positive towards the Iraq War showed up only when they also disliked US citizens in general (figure 3). The inverse effect is visible in figure 4, where data of participants who liked US citizens in general are shown. When we inspect both figures deeper, these trends were also obvious for distances to Baghdad and US cities (the squares located to the right of the rectangle which highlight the across distances).



**Figure 4.** Illustration of the *inverted* mental wall for the participants with a positive attitude towards US citizens by means of regression analyses with power functions. The  $x$ -axis represents physical air distances, the  $y$ -axis psychological/cognitive distances (both in km). Large points and small points show empirical data for participants with a negative or positive attitude towards the Iraq War, respectively: circles show across distances, diamonds show within distances, and squares show distances to Baghdad. Curves are fitted only to the across distances (which are also framed by the dashed rectangle).

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## General discussion

Participants had to estimate distances across the Atlantic Ocean (across distances) and distances within Europe and the USA (within distances). Distance estimations clearly followed a monotonic trend with increasing physical distances. Interestingly, the offset of this monotonic trend, which was modeled in the current paper by power functions, was strongly influenced by the complex interplay of two social attitudes.

### Across distances (between Europe and USA)

When participants disliked US citizens in general (negative attitude towards US citizens), they overestimated across distances strongly when having a negative attitude towards the Iraq War in mind. The reverse effect was seen for participants who liked US citizens in general: then, across distances were overestimated when they had a *positive* attitude towards the Iraq War.

These systematic cognitive distance distortions demonstrate once again how powerful cognitions are with regard to perceiving, processing, and assessing the real world. Following the idea of Carbon and Leder (2005), both offsets are straightforwardly interpreted in the sense of a mental wall. In the given scenario of global-scale effect, expanding previous results primarily based on individually navigable national distances, this effect is specifically termed as ‘cognitive continental drift’ following Friedman and Brown’s (2000) idea of ‘psychological plate tectonics’. From about 3000 km on this cognitive continental drift amounts to approximately 1000 km. Taking the example of the distance between two major cities in these two hemispheres, Berlin, the capital of Germany, and Washington, DC, the capital of the USA, the size of the cognitive continental drift amounts to more than 1350 km in the case of participants disliking US citizens. It should, however, not be forgotten that the provided data are correlational—thus we can speculate only on the cause of effects, as I do not have full longitudinal data pre and post Iraq War.

To get a complete picture of the data, we also have to discuss two further points: (1) in addition to across distances, within distances were affected by attitude towards the Iraq War; (2) why do the two groups with different attitudes towards US citizens show reverse effects?

### Within distances (within Europe or within USA)

Although being much less affected than across distances, within distances were also distorted by attitudinal factors. When participants had a negative attitude towards the Iraq War *or* if they disliked US citizens, within distances were overestimated compared with participants who had a positive attitude towards the Iraq War *or* if they liked US citizens, respectively. Both effects did not, however, add to each other. Importantly, only European but not US within distances were biased substantially. An appealing interpretation originates from the theory of social dominance orientation (SDO) (Pratto et al, 1994). According to SDO, societies minimize group conflict by creating ideologies that promote group inequality for legitimizing dominance or discrimination, respectively. Consequently, within distances should be overestimated if attitudes towards other cultures are negative as overestimated distances indicate a larger territory size. In the current experiment we asked for the attitude towards the Iraq War and the attitude towards US citizens. As already described, within distances were overestimated if any of these attitudes was negative. This demonstrates that even attitudes towards a war that is not directly linked with one’s territory can result in biased size estimation of that territory, although much weaker in magnitude. Future research should integrate specific SDO items to test these hypotheses further.

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**Effects of a cognitive continental drift**

The current experiment revealed an interesting effect regarding the general attitude towards US citizens. This specific attitude fundamentally changed the overall pattern of results triggered by the attitude towards the Iraq War. Whereas, for participants who disliked US citizens in general the European and American continents drifted apart when they also disliked the Iraq War, a converse effect was found for those participants liking US citizens in general. For them, both continents drifted apart if they had a positive attitude towards the Iraq War. One explanation for both of these effects stems from social identity theory (SIT) (Tajfel and Turner, 1979). Social identity is commonly defined as a person's sense of self, derived from de facto or attributed membership in social groups. Group membership lets us develop our sense of identity to a large extent mediated by that group. Social identity has been shown to be a central concept in understanding phenomena in political and social sciences, such as ethnic, nationalistic, and racial conflicts (eg Danesh, 2006; Griffiths, 2000; Ward and Masgoret, 2006). According to SIT we feel a strong need to categorize things and people—for instance, in terms of nationality, race, ethnicity, or attitudes. We overestimate in-group similarity and between-group differences (Allen and Wilder, 1979) leading to the out-group homogeneity effect (Ostrom and Sedikides, 1992). Participants who dislike US citizens are susceptible to emphasizing group differences between Europe and the USA. If they are also against the Iraq War, group differences will be further amplified, leading to strongly overestimated across distances. In contrast, participants who generally like US citizens tend to perceive much weaker group differences, and USA affairs tend to be integrated into in-group considerations. If such people have a negative attitude towards the Iraq War, the war and any deliberation of how to resolve the conflict are not any more a mere out-group problem of the USA, but will be interpreted as belonging to one's own sphere of influence. It is a well-known social finding that, under the impression of danger, threat, or pressure, group cohesion increases (Festinger, 1950; Rothgerber, 1977; Tajfel and Turner, 1979). Consequently, distances between Europe and the USA were *underestimated* by participants who liked US citizens but had a negative attitude towards the Iraq War.

Interestingly, people who liked US citizens and were positive towards the war *overestimated* distances between European and US cities. This contradicts simple predictions derived from the theory of mental walls (Carbon and Leder, 2005) which would assume underestimations of across distances. One trivial explanation could be that people with such a pattern of attitude favoring (former President George W Bush's) US foreign policy and the war do so on the basis of psychological reactance to usual European behavior. Such behavior can typically be observed when people are heavily pressurised to accept a certain view of attitude, to be politically correct, or to condone what is common sense. Given that the former US president was extremely unpopular in Europe, such psychological reactance can easily be triggered. Another explanation addresses the effect of overestimation of cognitive distances more directly by referring to SIT again. People who are positive towards US citizens and the war which was mainly initiated by the USA should identify themselves strongly with US policy and interests and the group of US citizens as such. Therefore, they should differentiate much more between both spheres of interest: the US and the European. Such differentiation should increase the distance between the category USA and Europe, and consequently the distances between both systems and the respective cities.

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### **Distance and caring**

What implications could cognitive continental drifts modulated by social attitudes have for everyday life, for intergroup relationships?

Wong and Bagozzi (2005) demonstrated a clear negative relationship between psychological distance and emotional intensity for the distant agent. Ghemawat (2001) provided an interesting approach of linking distance factors and economic opportunities. He developed a taxonomy of different distance categories spanning from cultural, administrative, geographic, and economic distances. Cognitive distance is very much linked to cultural distance, for which Ghemawat (2001) revealed impressive inverse relations to economic opportunities and, finally, economic success. Further evidence for positive implications of more proximal cultural distance stems from Peltokorpi (2008), who showed that expatriates with higher cultural empathy, measured by the multicultural personality questionnaire, were better adjusted in terms of work-related and non-work-related adjustment. Finally, Swift (1999) showed that reducing cultural barriers between markets helps to achieve greater degrees of closeness, which is a primary ingredient of effective business interaction.

In contrast to these findings, Smith (1998) emphasized the role of modern media in creating a sense of emotional involvement in distant lives. This can be illustrated by the case of the tsunami caused by the 2004 Indian Ocean earthquake that was vividly reported by the international press. Although the target region of South East Asia is quite distant from Western civilization, one of the biggest donation campaigns in history emerged from this hemisphere (cf Eggertson, 2006). A deeper analysis of the incidence reveals that distance alone is not the key factor for providing help as demonstrated by the fact that African nations, also hit by the 2004 tsunami, did not receive as much tsunami aid (Dumke, 2005). So, the specific relationship towards distant individuals, groups, nations, or countries should be carefully taken into account (Smith, 2001).

As further pointed out by Barnett et al (2005), the short-circuit assumption that distance equals the idea of a barrier and thus leads to indifference, with a lack of responsibility and care, as distance hides consequences, is not to be taken for granted. In contrast, distance can also mean the need and willingness of care giving. For instance, the distribution of international protests against the invasion of Iraq (eg retrievable via <http://www.worldmapper.org>) demonstrates that people in countries far away from the USA, such as in Europe (primarily, France, Germany, Great Britain, Italy, and Spain), or even more remote places such as Australia, did indeed raise their voice against the war. Interestingly, some of these countries with many protesters were also part of the allied troops invading Iraq. Protesters outnumbered participants in previous protests against taxes and former wars by far (Gordon, 2003), underlining the gap between people's attitudes and the strategic lines of political power.

Concluding, as heuristics play a major role in deriving conclusions and making decisions in everyday life (Laibson and Zeckhauser, 1998), misconceptions on farness or nearness of cities can but need not have an impact on economical, political, cultural, and social landmark ruling.

### **Outlook**

Although 1000 km drifts *sensu* Wegener (1929) as demonstrated within the current study, which would take many millions of years within the framework of plate tectonics, seem alarming, we should nevertheless remain optimistic. Considering the *cognitive* base of the continental drift as outlined above, essential steps for a reappraisal would include the following: public debate, social learning, and—finally—mutual understanding and its implication of generating common ideas and a common future. Anyone with such abilities should feel close, not far apart.

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