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THE COMPENSATION EFFECT IN PERCEPTION OF GROUPS: THE ROLE OF EPISTEMIC MOTIVATION

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Abstract

The compensation effect (CE) is a phenomenon that occurs when social targets are evaluated on two fundamental dimensions of social perception: warmth and competence. When two social targets are compared, the two dimensions appear to be intertwined to compensate one another. When one social object is perceived as being better than the second object on one dimension, the second object is perceived as being better than the first on the other dimension. In the literature the CE is assumed to be used in order to align the perceived differences between groups, which justifies the social system. However, this explanation was, to our knowledge, never proven in an empirical study and is difficult to apply in many research contexts in which the CE had already been demonstrated. In this thesis, we proposed an alternative explanation of the CE, that the underlying mechanism is simply related to applying knowledge that was previously acquired from an environment in which complementary and ambivalent stereotypes are widespread and where the dimensions of warmth and competence are often negatively related. We propose that the purpose of the CE is to obtain quick and easy solution to the task of evaluating social objects on two dimensions. Reaching the solution is possible by applying previously learned knowledge regarding the negative relationship between the two fundamental dimensions. As such, the CE should be an especially attractive tool for people who are motivated to obtain simple solutions, namely, people with high need for cognitive closure (NFCC). In a series of five experiments we demonstrated that: (1) the more people believe in a negative relation between warmth and competence (positive characteristics on one dimension imply negative characteristics on the second dimension), the stronger the CE (especially among high NFCC participants); (2) the CE is related to individuals' motivation to achieve closure: the CE appears among people with high, but not low NFCC, when nothing in the environment keeps them from using their preferred information processing styles; (3) experience of cognitive inconsistency refrains people high on NFCC from demonstrating the CE.

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1. Introduction

People make comparisons all the time, and one of the essential characteristics of the comparison process is its relativity. Just as warmth and competence have been shown to be fundamental dimensions in person as well as group perceptions, persons or groups that are evaluated on these dimensions can be perceived differently depending on the reference point. Women are said to be high on warmth but low on competence, whereas business people are viewed as high on competence but low on warmth. Graduates can be perceived as competent compared with freshmen but not as competent as professors. At the same time, graduates can be perceived as sociable compared with professors, but as unsociable compared with freshmen. This example illustrates a more general phenomenon, the compensation effect (Judd, James-Hawkins, Yzerbyt, & Kashima, 2005), which manifests negative relationship between these fundamental dimensions of social perceptions. When two social targets are compared on fundamental dimensions, when one target is perceived as being better than the second on one dimension, the second target is perceived as being better than the first on the other dimension. The compensation effect (CE) appears to put into practice the thought of R.W. Emerson from his essay "Compensation" that "every sweet has its sour; every evil its good" (1841/1907), at least in terms of the perceptions of social targets on two fundamental dimensions of social judgments. The CE has been demonstrated in research that used novel groups and individuals (Judd et al., 2005; Kervyn, Judd, & Yzerbyt, 2009; Yzerbyt, Kervyn, & Judd, 2008), the minimal group paradigm (Judd et al., 2005; Kervyn, Yzerbyt, Judd, & Nunes, 2009), national groups (Kervyn, Yzerbyt, Demoulin, & Judd, 2008; Yzerbyt, Provost & Corneille, 2005), indirect and implicit measures (Kervyn, Yzerbyt, & Judd, 2011) and impression formation (Kervyn, Yzerbyt, Judd, & Nunes, 2009). More recently, the existence of the negative relationship between warmth and competence was also shown in other than comparative contexts. For example, Kervyn, Bergsieker, and Fiske (2012) demonstrated that obtaining only positive information about a person in terms

of warmth results in inferring negative characteristics of that person in terms of competence. Despite the fact that the CE was shown in many different studies that used different measures and paradigms, the question of why the CE would emerge in social perception still has no satisfactory answer. Thus, the main aim of this thesis is to identify the mechanism underlying the effect that potentially influences a wide variety of aspects of a social life.

1.1. Warmth and competence as two fundamental dimensions of social perception of individuals and groups

Although research on person and group perceptions differs slightly in terminology and interpretations, many theories postulate two fundamental dimensions of social perceptions of individuals and social groups (compare: Abele & Wojciszke, 2007; Fiske, Cuddy, & Glick, 2006; Judd et al., 2005; Wojciszke, 1994; Wojciszke, 2005). The first insight on this issue can be found in the classic work of Salomon Asch (1946). He discovered that an impression about an individual changed depending on adding a single word (warm or cold) to a list of such traits as intelligent, skillful, industrious, determined, practical or cautious. He demonstrated that when the word "warm" was added to the list, an individual was perceived as being wise, and when the word "cold" was added, the person was perceived as being sly. Rosenberg, Nelson and Vive-Kananthan (1968), using multidimensional scaling, tested the structure that underlie the 64 traits that people usually use to describe others. The authors identified two dimensions that most adequately describe the general structure of perceptions of people, namely, intellectually and socially good or bad. Additionally, in the group perception domain, Phalet and Poppe (1997) found that two dimensions underlie the structure of 60 ethnic and national stereotypes. Thus, various terms used to describe two dimensions of social perception, although they originate from different theoretical and research traditions and emphasize different issues, have been proposed to be, among others: agency and communion (Abele & Wojciszke, 2007; Bakan, 1966), individualism and collectivism (Hofstede, 1980; Triandis, 1995), independent and interdependent self-

construals (Markus & Kitayama, 1991), and competence and warmth (Fiske, Cuddy, Glick, & Xu, 2002; Fiske, Xu, Cuddy, & Glick, 1999). In sum, irrespective of whether it is a person or group perception, two fundamental dimensions appear to underlie people's judgments.

In this thesis, however, we focus on competence and warmth, as the CE is described in the literature with terms from the stereotype content model (Fiske et al., 2002). According to this model, the stereotypical beliefs shared by members of a given society can be described using two independent dimensions of social perception: warmth and competence. Warmth is linked to friendliness, helpfulness, sincerity, and trustworthiness; competence is linked to efficiency, conscientiousness, intelligence, and skill. It is assumed that these dimensions are independent, and thus that stereotypes do not have to be purely negative; rather, they can be, and usually are, ambivalent. This is the case when high evaluation on one dimension is accompanied by low evaluation on the second, i.e., high warmth, low competence (paternalistic stereotype) and high competence, low warmth (envious stereotype). The two remaining stereotypes from the fourfold typology are admiring (high warmth, high competence) and contemptuous (low warmth, low competence). In later works on the so-called BIAS map (Cuddy, Fiske, & Glick, 2007) the authors established a dominant profile of behavioral tendencies and emotions that could be ascribed to each of the four stereotypes. The relative importance of those two dimensions in the perception of the social world has been examined in many studies. Moreover, the above authors established that warmth and competence are universal and they occur in various countries and cultures and that within a given society, attaching particular stereotypes to certain groups is relatively stable. It is assumed that these stereotypes stem from social structures, i.e., perceived status hierarchy and perceived competitiveness between groups (Cuddy et al., 2009). This structuralistic approach encourages the analysis of group stereotypes (positioning the group along the warmth and competence dimensions) as stable and static structures. Although the stereotype content model was thoroughly verified across many countries and cultures, the

initial research was purely correlational. This fact encouraged researchers (Judd et al., 2005) to test the dynamic relation between warmth and competence in experimental designs.

1.2. The compensation effect

The research by Judd et al. (2005) was the first that was designed to experimentally test the compensatory nature of the relationship between warmth and competence in social perceptions. These authors used artificial groups to control all of the information that was provided to participants, who learned about the behaviors of two groups. Whereas some learned about two groups that differed in competence (one high and one low), others learned about two groups that differed in warmth (also one high and one low). The participants then judged the two groups both on the dimension that was manipulated and on the other, unmanipulated dimension, and the results revealed the CE. On the manipulated dimension, the high group was evaluated higher than the low group. On the unmanipulated dimension, this difference was reversed, with the high group being evaluated lower than the low group. Interestingly, Judd et al. (2005) reported empirical evidence that this compensation effect between competence and warmth applied not only when two groups were evaluated but also when it was two individuals.

In the paper mentioned above, the term "compensation effect" had not yet been introduced. Researchers referred to it as a "compensation process" (Judd et al., 2005) or, in another article on similar issues, a "compensation hypothesis" (Yzerbyt, Provost, & Corneille, 2005). To the best of our knowledge, the term "compensation effect" was used for the first time in an article by Yzerbyt, Kervyn, & Judd (2008), and since then, it has been commonly used in the literature to describe the negative relationship between the dimensions of warmth and competence when two targets are judged. The definition of the compensation effect that was introduced by Kervyn, Yzerbyt and Judd (2011, pp. 144) is as follows: "a tendency to differentiate two social targets in a comparative context by contrasting them on the two fundamental dimensions in a compensatory direction".

Initially, researchers argued that the negative compensatory relationship between the two dimensions emerges only when the targets are in comparative contexts; when only one object was evaluated, the halo effect rather than the CE emerged (Judd et al., 2005). More recently, researchers argued that a similar effect also referred to the impressions formed regarding single targets: the person characterized only as competent (warm) was also perceived as being cold (incompetent) (Kervyn, Bergsieker, & Fiske, 2012). Moreover, in a series of four studies on impression management, researchers demonstrated that when participants wanted to appear high on a given dimension (e.g., competence), they downplayed their characteristics on the second dimension (e.g., warm) (Holoien & Fiske, 2013). Moreover, Yzerbyt and colleagues (Yzerbyt, Kervyn, & Judd, 2008) showed that the CE does not work with any pair of dimensions but appeared to be unique to the two fundamental dimensions. That is, when one social target is perceived to be more competent (warm) than the other, that target is also perceived as being less warm (competent) than the other and vice versa. However, this effect disappears when objects are evaluated on different pairs of dimensions, for instance, warmth/competence and healthiness (Yzerbyt et al., 2008) or warmth/competence and political interest (Holoien & Fiske, 2013).

1.2.1. Determinants of the CE according to system justification theory

Although the CE was identified in many different research designs, across different experiments and correlational studies, the question about its exact determinants has remained open for a decade. The goal of this thesis is to propose an answer to the question.

Some researchers suggest that the CE results from a concern for distributive justice (Jost & Banaji, 1994; Kay & Jost, 2003; Kay et al., 2007). According to system justification theory (SJT), people are motivated to perceive their social worlds as fair, legitimate, and just places. Thus, they are motivated to develop stereotypes that satisfy their desire to justify the existing social relationships. In one of the crucial studies for this theory, participants who were exposed to complementary stereotypes, such as "poor but happy", "poor but honest",

"rich but miserable" and "rich but dishonest", presented greater beliefs in the social system compared with when they were exposed to noncomplementary stereotypes, e.g., "poor and unhappy" or "rich but happy" (Kay & Jost, 2003). Complementary stereotypes encourage the assumption that every group in the society receives a fair share, and, as such, complementary stereotyping helps people satisfying their system justification motive, defined as their striving to perceive the societal status quo as fair (Kay et al., 2007). The belief that every group has its own strengths and weaknesses, motivated by a belief in a fair world, is presented as an explanation for the CE; the CE allows for aligning different groups, which leads to system justification and balances the social structure. Such hydraulic compensatory relationship between different social objects is suggested to be a deliberate attempt to seek justice in the world (Kervyn, Yzerbyt, Demoulin, & Judd, 2008; Kervyn, Yzerbyt, & Judd, 2010). References to SJT as a potential explanatory mechanism are present in nearly every work regarding the CE. However, recently, this explanation has been presented in a more restricted version. According to Yzerbyt and colleagues (Yzerbyt, Kervyn, & Judd, 2008), the motivation to perceive a system as just could be an explanation for the CE solely under the assumption that it involves only two fundamental dimensions of social perception: warmth and competence. From this point of view, positives and negatives should be equally distributed among groups not on just any dimensions but only on dimensions that matter (Kervyn, Yzerbyt, & Judd, 2010).

This explanation for the CE reveals some difficulties. First, SJT refers mainly to group processes and assumes some conscious deliberation; thus, this explanation cannot be applied to the effects that were shown using indirect and implicit measures. If the CE represents an attempt to seek justice in the world, then it should not be an automatic, nonconscious process (Kervyn, Yzerbyt, Demoulin, & Judd, 2008; Kervyn, Yzerbyt, & Judd, 2011). Moreover, the CE was evident not only when groups were chosen as targets of evaluations but also, as discussed above, when participants formulated judgments regarding individuals or were managing impressions about themselves, which is a vast deviation from

the theoretical assumptions of SJT. Thus, even a restricted explanation of the CE in accordance with SJT warrants questioning. The most recent works on the CE emphasize that its underlying mechanism needs to be explored (Holoien & Fiske, 2013). Moreover, despite the fact that explanation of the CE using SJT was postulated in one of the first papers on this effect (Judd et al., 2005) and was systematically repeated thereafter, to our best knowledge, none of the research demonstrated any evidence of a relationship between the system justification motivation and the CE.

The exception is the research by Durante and colleagues (Durante et al., 2013) that tested the relationship between system justification motivation and the CE. The researchers argued that the higher a society's income inequality (measured with the Gini index), the lower the average overall correlation between warmth and competence in evaluations of different groups in a given country. Low correlation between warmth and competence was regarded as an indicator of ambivalence in the perceptions of groups. This pattern of results was interpreted as an indicator of the CE and, in line with SJT, as a rationalization of economic disparities in social judgments: the greater the income inequality, the more social groups need to be rewarded. However, neither the CE as such nor the system justification motivation were measured in this research. Moreover, it is well-known that correlation does not imply causation. Thus, it cannot be stated even under the assumption that the methodology used in this research allows for drawing conclusions regarding the CE, that people use the CE to justify existing inequalities.

Cichocka and colleagues (Cichocka, Winiewski, Bilewicz, Bukowski, & Jost, 2015) tested the relationships between complementary stereotypes and the system justification motive. Using data from a nationally representative survey, the authors revealed that stereotypical evaluations of ethnic minorities as being low in morality but high in competence, or high in morality but low in competence, were associated with greater system justification. These results, however interesting, do not refer directly to the CE because the

authors tested the perceptions of a given group separate from the perceptions of other groups and used dimension pairs other than warmth/competence.

Explanations for the CE in accordance with SJT, although they have been postulated for a decade, first, bring theoretical difficulties, and second, have never been proven. Therefore, in this thesis, we suggest an alternative explanation.

1.2.2. Why does the CE exist? A proposed explanation based on the theory of lay epistemics

In this thesis, we propose to explain the CE based on the theory of lay epistemics (TLE) (Kruglanski, 1989). In general, the TLE considers the process of knowledge formation: how people in everyday life acquire knowledge, how they use it, and why in that way rather than another (for a review, see: Kruglanski, Dechesne, Orehek, & Pierro, 2009). The first important assumption of the TLE is that knowledge is formulated and applied through the use of the "if, then" inferential rule, and social judgments, as with any judgments, are made through reasoning from premises to conclusions. The reasoning is syllogistic and includes a major premise ("if X, then Y") and a minor premise that provides evidence that the major premise applies to a given case ("Z is X", thus "Z is Y") (Kruglanski, Pierro, Mannetti, Erb, & Chun, 2007; Kruglanski & Shteynberg, 2012; Kruglanski et al., 2009). For example, such reasoning can be applied if someone believes that "if mother, then warm" (major premise), then because a given woman has children (minor premise), she must be warm (conclusion). Such reasoning does not have to be conscious, and even the most basic perceptual judgments can be interpreted as rule based (Kleffner & Ramachandran, 1992), just as with classical (Holyoak, Koh, & Nisbett, 1989) and evaluative (Mitchell, DeHouwer, & Lovibond, 2009) (see also: Kruglanski & Gigerenzer; 2011; Kruglanski & Shteynberg, 2012) conditioning. Such knowledge could be acquired through everyday experience, socialization, and epistemic authorities (e.g. parents, peers) or through acculturation (Kruglanski & Gigerenzer; 2011) and routinized through practice, as with procedural knowledge

(Kruglanski & Shteynberg, 2012; Neal, Wood, & Quinn, 2006). In consequence, such routinized, easily accessible rules can be used with minimum cognitive resources when appropriate cues (minor premises) can be found in an environment.

In this thesis, we propose to explain the CE as the application of simple rules, such as "if competent, then cold", "if helpful, then naïve", "if sarcastic, then intelligent", etc. Such rules can be acquired through contact with complementary and ambivalent stereotypes (Fiske et al., 2002; Kay & Jost, 2003), during socialization and acculturation (Chiu & Hong, 2006). This reinterpretation is more universal than the explanation based on SJT, and it allows for resolving the problems described above (e.g., the CE emerges at the individual level, in impression management, using indirect and implicit measures).

1.3. Who should exhibit the CE and why? The moderating role of epistemic motivation

According to the TLE, task characteristics and the basic motivation for information processing (i.e., need for cognitive closure) can affect the process of forming social judgments. The need for cognitive closure (NFCC) reflects the desire for firm knowledge (Kruglanski, 1989)[1], and this need is met through two mechanisms: "seizing" and "freezing" (Kruglanski & Freund, 1983; Kruglanski & Webster, 1996). People with high (vs. low) NFCC present a stronger tendency to selectively focus on early, closure-affording evidences, and they instantly incorporate judgments that the evidences suggest to an existing knowledge structure. As a consequence, they need less information to make judgments and are less prone to changing their judgments based on newly obtained information (Webster & Kruglanski, 1997). In other words, people with high NFCC present a stronger tendency towards heuristic information processing and prefer to use simple rules and to process information in a more general manner. Additionally, after they identify a clue, they are more prone to applying the related rule, and as a result, they terminate their information

[1] The literature distinguishes between the specific and the nonspecific need for closure. However, this distinction is not crucial for this thesis, and thus only the broad definition is presented.

processing and draw their conclusions. These basic differences between people with high and low NFCC have far-reaching consequences for a variety of phenomena, such as attribution processes, the tendency to use stereotypes, negotiation behavior, communication and persuasion, empathy, conservatism, attitudes towards autocratic leadership, attitudes towards immigration, loyalty to a group, etc. (Kruglanski et al., 2009). Predictions derived from the NFCC were verified in hundreds of studies, on intrapersonal, interpersonal, and group levels, and using direct, indirect, psychophysiological (for review see: Kossowska, 2005; Kruglanski, 2004; Kruglanski, Pierro, Mannetti, & DeGrada, 2006; Kruglanski et al., 2009; Roets, Kruglanski, Kossowska, Piero, & Hong, *in press*; Webster & Kruglanski, 1996) and neurocognitive methods (Kossowska et al., 2014).

One fact is crucial for further discussion, namely, that people with high NFCC are more prone to using universal and simple "all-purpose" rules that can be easily applied in many different contexts and situations (Kruglanski et al., 2009). Thus, if this proposed reconceptualization of the CE that applies the "if, then" rule is correct, the effect should be especially likely to emerge among people with high NFCC. This phenomenon should also hold especially for complex tasks such as comparing social objects on two dimensions. One of the essential elements of the decision making process involves comparing objects based on their characteristics. As a result, relativity is an essential component of all judgments (Huttenlocher, Higgins, & Clark, 1971; Posten & Mussweiler, 2013). Whenever we evaluate the characteristics of a person or a group, we assess them in relation to other people or groups. Different people and groups are more or less competent and more or less warm, and therefore, the first step in comparing two social objects would be to determine their mutual positions on one of the dimensions, e.g., object X is more/less competent than object Y. In most of the research on the CE, these relationships can be directly inferred (the behaviors of group X predominantly indicate competence, whereas the behaviors of group Y indicate incompetence). The next step should be determining the relationship between objects being judged on the second dimension.

Comparing two targets can be complex, and the amount of information taken into consideration in order to compare the targets can be vast. In the most popular paradigm used in CE research, using information about objects on one dimension, participants must evaluate these objects on the other dimension. In these cases, there are at least four obvious solutions: both objects can be high on the second dimension; both objects can be low on the second dimension; one object can be low on the second dimension while the other object is high; and one object can be high on the second dimension while the other object is low. However, there are also other, intermediate potential solutions, e.g., both targets can be mediocre on the second dimension; one can be mediocre while the other is very high, etc. The number of different solutions and strategies that can be potentially considered is extensive. Thus, profound processing of information regarding two social objects on two dimensions, and establishing mutual relationships between them, could require sufficient motivation and resources. Applying previously learned knowledge regarding the relationship between two dimensions while addressing the task allows for quickly and easily reaching a solution.

Therefore, the CE understood as the application of a simple rule can be used as a universal and powerful tool for the quick and easy evaluation of diverse social situations: object X is more competent than Y; if X is competent, then X is also cold; if Y is incompetent, then Y is also warm. Of course, this process should be understood in a continuous manner: the more object X is perceived as being more competent than Y, the more object Y is perceived as being warmer than X. In other words, the more a person differentiates two social objects on one dimension, the more she/he differentiates them on the second dimension in the opposite direction. Thus, the compensation rule should be especially attractive for people who are motivated to seek quick, firm answers (high NFCC) and less attractive for people who prefer to process information more exhaustively (low NFCC). If this reasoning is correct, it can be expected that people who are especially motivated to use

heuristics (high NFCC) will use the CE to a greater extent than will people who do not have this motivation (low NFCC).

Showing that the CE is mainly used by people with high NFCC is not sufficient for convincingly demonstrating that its underlying mechanism can be interpreted as the use of simple heuristics. In an ideal research design, it should be demonstrated that the CE is associated with all of the other mechanisms that have been found to moderate the effects of epistemic motivation, but such attempts exceed the means and ambitions of this thesis. However, to increase the validity of the proposed reinterpretation of the CE as applying a simple rule, the postulated mechanism will be tested in relation to a potential moderator: the experience of cognitive inconsistency.

1.4. Why do people who regularly exhibit the CE sometimes not do so?

The CE, understood as the application of previously learned knowledge regarding the relationships between social perception dimensions that can serve as heuristic for evaluating social objects, should be especially attractive for people who are high in NFCC, although there are situations in which the motivation itself does not lead to relying on one's preferred style of information processing. Some factors may work as a "stop signal" (Kossowska, Bukowski, Guinote, *under review*) that keeps individuals from using their typical information processing strategies. A series of studies demonstrated that such factors as control deprivation (Otten & Bar-Tal, 2002; Kossowska, Dragon, & Bukowski, 2014), self-image threat (Kossowska, Bukowski, Guinote, *under review*), low perceived ability to achieve closure (Bar-Tal & Guinote, 2002; Bar-Tal, Kishon-Rabin, & Tabak, 1997; Kossowska & Bar-Tal, 2013a), and powerlessness (Kossowska, Guinote, Strojny, *under review*) lead to the reversal of the effects associated with NFCC. Behaviors that are typically connected with high NFCC, such as stereotyping, recalling schema-consistent information, lower cognitive complexity, the tendency to heuristic information processing, etc., occurred among people

with low NFCC, and conversely, people with high NFCC demonstrated less stereotyping, fewer schema-following tendencies, higher cognitive complexity, lower tendency to use heuristics, etc. It is also worth noting that such factors as positive mood and empowerment increase information processing in accordance with preferred processing styles (Kossowska & Bar-Tal, 2013b; Kossowska, Guinote, & Strojny, *under review*; Kossowska, Jaśko, Bar-Tal, & Szastok, 2012). Such factors can be interpreted as "green light" information from the environment indicating that the default processing style is efficient and there is no need to change it. Similar effects of a "stop signal", although not in an NFCC context, were discovered by Posten and Mussweiler (2013). The researchers established that the experience of distrust led people to form less stereotypical judgments compared with their experiences of trust. What all "stop signal" factors have in common is that they are unpleasant, they are not individuals' default states of functioning, and as such, they can induce uncertainty (Kossowska, 2014). This experience can serve as an environmental cue that one's routine strategies are inefficient and that more cognitive resources need to be used in unusual situations to resolve a task.

In our research, we used the experience of cognitive inconsistency as a "stop signal". Festinger (1957) described cognitive consistency as a psychological need that is as basic as hunger and thirst. Lack of consistency elicits an aversive state of arousal (dissonance) that motivates people to reduce the underlying inconsistency. Recently, researchers proposed a different conceptualization of cognitive inconsistency. Kruglanski and Shteynberg (2012) defined it as a means of knowledge verification, as a marker that something is wrong or that one's system of beliefs contains an inaccuracy. Gawronski (2012) also proposed understanding of cognitive inconsistency as a cue that informs about errors in one's belief system. If two premises contradict one another (e.g., object X is warm and object X is cold), inconsistency emerges and triggers the motivation to resolve it. If an individual does not have adequate resources to resolve inconsistency, subjective certainty regarding an appropriate solution decreases (Gawronski, 2003; Gawronski, 2012). Consequently, the

perceived difficulty of the task increases, which can serve as a cue that more cognitive resources are necessary for resolving the task. Hence, when experiencing inconsistency, people can perceive tasks as more demanding and adapt to them by changing their preferred information processing styles in order to resolve them. Such adaptation will have different consequences for people with low versus high NFCC. People who by default prefer using simple, effortless heuristic processing (high NFCC) can adapt by engaging more resources and more effortful strategies, whereas people who normally use effortful processing (low NFCC), when the task's perceived difficulty increases, can seek simpler, heuristic strategies.

Thus, we assume that the experience of cognitive inconsistency leads to changing one's preferred information processing style. Consequently, if the CE can be interpreted as a heuristic tool used to establish relationships between social objects, as is assumed in this thesis, then after being confronted with the "stop signal", individuals with high NFCC should demonstrate the CE to a lesser extent than should those with low NFCC.

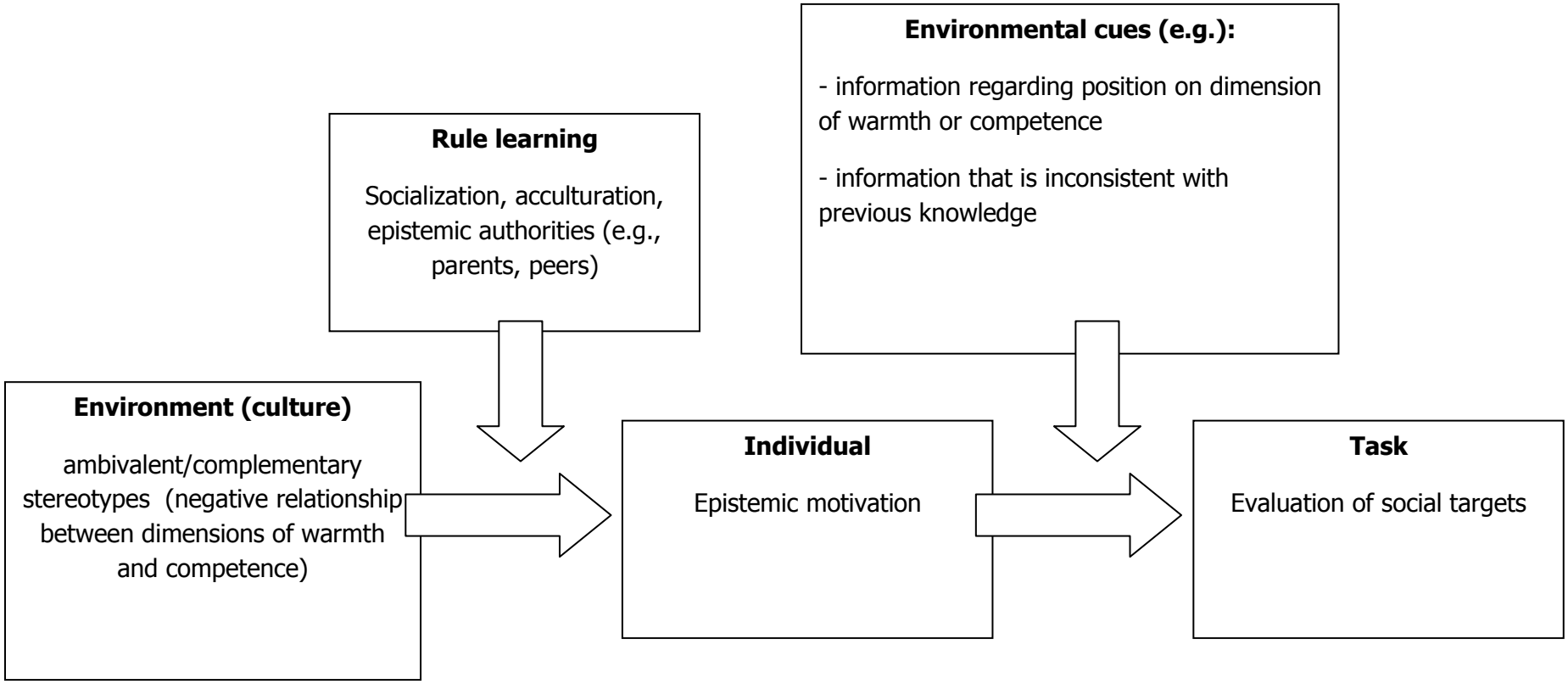
1.5. Overview of the study

When two social objects are compared on two fundamental dimensions of social perception, it appears that warmth and competence compensate one another. This phenomenon is generally explained as motivated by the need to view the social world as fair, legitimate, and just, and this motivation can be satisfied by maintaining the belief that every group has its own strengths and weaknesses (complementary stereotypes). The CE is assumed to be a tool for aligning differences between groups, which should lead to system justification and maintaining balance in the social structure. This explanation, although it has appeared in nearly every paper on the CE, has, as far as we know, never been empirically proven. Moreover, it is difficult to apply it to research in which the CE was shown for indirect and implicit measures, or for individuals rather than groups and where there was no comparison context.

In this thesis, we suggest that the CE is a cognitive tool which purpose is not to maintain one's belief in a fair world but to achieve a quick and easy solution to a complex task of evaluating social objects on two fundamental dimensions. As depicted in the figure below (Figure 1), the proposed explanation contains a number of assumptions.

First, we assume that the negative relationship between the dimensions of warmth and competence is learned from the environment ("if competent, then cold"), for example, from contact with prevalent ambivalent or complementary stereotypes. Second, we assume that belief in a negative relationship, as the knowledge structure becomes a possible response, when associated with this knowledge cue (minor premise) occurs (e.g., target A is competent, target B is incompetent; thus, target A is cold, target B is warm). Third, this response should be especially appealing to people who are motivated to find quick and firm answers (high NFCC) to their questions. In this case, the question would be how to evaluate and perceive two different social objects on the dimensions of warmth and competence. Fourth, if the CE is related to epistemic motivation, other environmental cues (such as the experience of inconsistency) should affect individuals' tendency for using the CE in a similar way as they affect other phenomena related to epistemic motivation (e.g., stereotyping, schema-driven information processing).

Figure 1. Schematic representation of the theoretical model tested in this thesis.



For this thesis, we tested all of these assumptions except for the first one in a series of five experiments; to test the first assumption, long-term developmental research should be conducted, which exceeds the means and ambitions of this thesis. Moreover, it is important to note that in this thesis, we do not deny a potential relationship between system justification motivation and the existence of complementary or ambivalent stereotypes. People share in the complementary and ambivalent stereotypes that exist in their cultures. Perhaps these stereotypes' function, possibly among many, is to mask socioeconomic disparities and rationalize and maintain the status quo (Durante et al, 2013; Fiske, Cuddy, Glick, & Xu, 2002; Jost & Banaji, 1994). What we propose in this thesis is that this motivation does not necessarily have to determine the CE; we believe that the underlying mechanism is simply related to applying knowledge that was previously acquired from an environment in which complementary and ambivalent stereotypes are widespread and where the dimensions of warmth and competence are often negatively related. If the CE is based on applying such knowledge, it can be used to solve tasks such as comparing social objects on two fundamental dimensions of social perception. Such quick and easy solutions should be especially attractive for people with high (vs. low) NFCC when there is no disruptive environmental cue ("stop signal"), e.g., the experience of inconsistency. When there is such a disruptive cue, the pattern of results may reverse. Thus, in the first study described in this thesis, we tested the following hypotheses that the CE stems from a negative relationship between fundamental dimensions of social perceptions:

Hypothesis 1: Belief in a negative relationship between warmth and competence (that is, if someone is high on one dimension, she/he is low on the other) results in the CE. The stronger one's belief in this negative relationship, the more she/he will present the CE.

Hypothesis 2: The effect of the belief in a negative relationship between warmth and competence on the CE will be stronger for people with high (vs. low) NFCC.

In four other studies, we tested the third and fourth assumptions of our model, namely, that the CE can be especially appealing for people with high NFCC but that this preference can be modified by environmental cues. Thus, we examined four general hypotheses:

Hypothesis 3: When there is no inconsistency, people with high NFCC will show the CE to a greater extent than will people with low NFCC.

Hypothesis 4: After experiencing inconsistency, people with high NFCC will show the CE to a lesser extent compared with people with low NFCC.

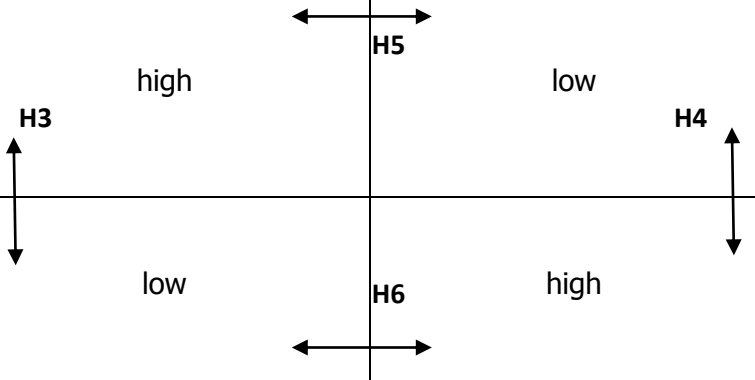
Hypothesis 5: People with high NFCC who experience inconsistency will show the CE to a lesser extent than will people with high NFCC who do not experience inconsistency.

Hypothesis 6: People with low NFCC who experience inconsistency will show the CE to a greater extent than will people with low NFCC who do not experience inconsistency.

Hypotheses 3 to 6 are schematically presented below in Table 1.

Table 1. Schematic representation of hypotheses 3 to 6.

	Consistency	Inconsistency
high NFCC	high	low
low NFCC	low	high



Although the CE has been shown in different research contexts, all experiments described in this thesis were conducted using direct measures in an intergroup context in which two targets were compared with one another. Three of the experiments were conducted online, and two used high school students as samples. This approach allowed us

to show that the results obtained were not solely attributable to the method of administering the studies. For each study, we aimed to collect at least 45 participants, based on an a priori power analysis with medium effect size (f = 0.25) and power at .80. We conducted no statistical analyses before we finished collecting the data.

In study 1, we tested the assumption that the CE stems from participants` beliefs in a negative relationship between warmth and competence. Belief in negative relationships between fundamental dimensions was assessed by asking participants to evaluate the degree to which they believed in inferential rules such as "if someone is competent, she/he is also cold". We assumed that only people who believed in a negative relationship between warmth and competence would exhibit the CE (hypothesis 1). We also assumed that such a belief would more greatly influence people with high (vs. low) NFCC to rely on the CE because they are more prone to using universal, easy-to-apply rules (hypothesis 2).

The aim of experiment 2 was to test our most general predictions regarding the relationship between NFCC and the CE, namely, that the CE will be positively related with NFCC when no warning "stop signal" environmental cue is present (the higher the NFCC, the stronger the CE); we used artificial groups as targets. Before experiment 2, we conducted a pilot study to test the experimental procedure. Based on the pilot's results, in the actual experiment 2, we introduced a training session. We expected a positive relationship between the CE and NFCC (hypothesis 3).

In experiment 2, no control condition was present; we tested general predictions regarding the relationship between NFCC and the CE. Thus, in experiments 3 and 4 we also provided a control condition. These experiments were also preceded by a pilot study, which aimed to select comparison targets (national groups) that were perceived as being ambivalent on warmth and competence. In addition, experiments 3 and 4 allowed us to test the generalizability of the results obtained in experiment 2 in new contexts. In experiment 3, we used national rather than artificial groups. We also introduced the experience of

consistency to test the relationship between the CE and NFCC (hypothesis 3). That is, in the experimental condition, we provided participants with information that was consistent with their previous stereotypical knowledge regarding one of the evaluated groups, and in the control condition, we gave participants information that was neither consistent nor inconsistent. We expected that in both conditions, participants would act in accordance with their preferred ways of information processing, i.e., heuristic for people with high NFCC and more exhaustive for those with low NFCC. Thus, we also expected a stronger CE among people with high (vs. low) NFCC. These results would have provided support for interpreting the CE as a cognitive tool preferred by people who are motivated to seek quick and easy solutions to tasks.

In experiment 4, we also used national groups, but this time we provided a "stop signal" cue, namely, the experience of inconsistency. That is, in the experimental condition, participants obtained information that was inconsistent with their previous stereotypical knowledge regarding one of the evaluated groups. In the control condition, as in experiment 3, they were provided with information that was neither consistent nor inconsistent. The experience of inconsistency in the experimental condition should have kept participants from using their preferred ways of processing information, and thus, we expected a negative correlation between CE and NFCC (hypothesis 4). In the control condition, the pattern of results was expected to be the same as in experiment 3 (hypothesis 3). Thus, in experiment 4, we could also test hypotheses 5 and 6. Confirmation of these predictions would provide additional evidence that the CE is related to epistemic motivation because the factors that moderated the effects of NFCC would also influence the CE.

In study 2, there was only one condition. In experiments 3 and 4, there were two conditions: experimental (the experience of consistency in experiment 3 and the experience of inconsistency in experiment 4) and control. In experiment 5, we tested all three conditions in one study design by providing information that was inconsistent with stereotypical

knowledge, information that was consistent with this stereotypical knowledge, and no information in the control condition. In this experiment, we used the same consistency context as in experiments 3 and 4, but instead of national, we used real groups. Furthermore, instead of manipulating consistency/inconsistency on the warmth dimension as in studies 3 and 4, we manipulated the competence dimension. Moreover, we tested in this experiment one hint that was presented in previous research, namely, that changes in the perceptions of a given group (for example, as a result of an anti-stereotype intervention) on one dimension could change evaluation in the opposite direction on the second dimension (Kervyn, Yzerbyt, & Judd, 2010). It was an interesting suggestion that could have led to important practical consequences that had not—according to our best knowledge— been tested to date. Thus, in experiment 5, we first tested all hypotheses in one research design; second, we tested the robustness of the previously obtained results using different group contexts and manipulating different dimension; and third, we tested whether the CE was also related to changes in the perceptions of groups. Hypotheses 3, 4, 5 and 6 were tested in this study.

2. Research

2.1. Experiment 1

We assumed that the negative relation between warmth and competence ("if competent, then cold"), is learned from environment, e.g., from contact with prevalent ambivalent/complementary stereotypes. Although the process of actual learning such a rule will be hard to test, it is possible to test whether people incorporated such rule, and if so, whether they use it while evaluating two social targets on dimensions of warmth and competence. Such rule, if exists, should also stronger influence behavior of people high in NFCC, as they are more prone to use universal, easy to apply rules. Hypotheses tested in this experiment were: belief that if someone is high on one dimension, she/he is low on the opposite fundamental dimension of social perception (complementary rule) is positively related to the CE, i.e., the stronger one's belief in complementary rule, the stronger the CE (hypothesis 1). Moreover, we expected the positive relationship between belief in the complementary rule and the CE among people high but not low in NFCC (hypothesis 2).

Participants

Eighty five high school students participated in the experiment on a voluntarily basis (44 women, 41 men; M_{age} = 17.60; SD = 0.52).

Materials and procedure

At the beginning of the session participants evaluated two outrgoups, i.e., culinary school students and business school students in terms of warmth, competence and morality. The group of culinary school students is stereotypically perceived as warm and incompetent, while group of business school students is perceived as competent and cold. Order in which these groups were evaluated was counterbalanced. As researchers argue that morality can be one of the most important dimension in impression formation (e.g. Abele, Uchronski,

Suitner, & Wojciszke, 2008; Abele & Wojciszke, 2007; Wojciszke & Abele, 2008; Wojciszke, Bazinska, & Jaworski, 1998), even more important than warmth (Goodwin, Piazza, & Rozin, 2014), we decided to control for its influence. Items used in this study were: warm, friendly, helpful (for warmth), competent, capable, intelligent (for competence), and moral, honest, good (for morality). Participants answered on a seven-point scale (1 = not at all; 7 = very much).

Reliabilities for the scales were as follow: culinary school warmth α = .72; culinary school competence α = .75; culinary school morality α = .84; business school warmth α = .74; business school competence α = .79; business school morality α = .75. Items related to a given dimension were averaged into an index. The higher the index the higher group was rated on a given dimension.

Secondly, participants completed a short version of NFCC scale (Kossowska, Hanusz, & Trejtowicz, 2012; Webster & Kruglanski, 1994). Only three from five subscales were used for a further analyses: preference for order and structure in the environment, predictability of future contexts, and affective discomfort occasioned by ambiguity, as closed-mindedness and decisiveness were not correlated with any other subscale[2]. It is established that decisiveness subscale measure ability rather than motivation (Bar-Tal & Kossowska, 2010; Roets & Van Hiel, 2007). Perhaps closed-mindedness subscale also captures different phenomenon (see Neuberg & Newsom, 1993). Reliability of the scale was α = .81. Items were averaged into an index of NFCC (*M* = 3.76; *SD* = 0.82). The higher the index the higher NFCC.

Finally, participants evaluated the degree to which they agree that one trait implies another. We used procedure to evaluate the strength of inferential "if … then …" rules identical with those suggested by Orehek and colleagues (Orehek, Dechesne, Fishbach,

[2] The lack of correlation of these two subscales with other subscales reveled in all of the other experiments described in this thesis, therefore in all experiments we used NFCC score based on just three subscales listed above.

Kruglanski, & Chun, 2010). Participants rated their agreement with the statement "if someone is A, then she/he is B" on a 9 points scale (from 1 strongly disagree to 9 strongly agree). Participants evaluated 18 pairs of traits, from which 8 were complementary: 4 items high on warm, low on competence (e.g., if gawky, then warm), 4 were low on warm, high on competence (e.g., if brilliant, then unkind). Four items were consistent in both dimension and valence (e.g., if protective, then kind), and were used as a baseline for participants individual tendency in evaluation. Moreover, 2 items were low on both dimensions, 2 items were high on both dimensions, and 2 last items were contradictory (e.g., if kind, then heartless), and were used as control items. As it was shown in aforementioned paper, the sequence in the rule is important: if someone is gawky, she/he can be perceived as warm, but if someone is perceived as warm, she/he does not necessarily has to perceived as gawky. Thus, we controlled the sequence in which a given trait was presented: participants firstly evaluated a set of pairs of traits, in which trait X was a premise, and trait Y a conclusion, and subsequently, a second set consisting of the same pairs of traits, but in which trait Y was a premise, while trait X a conclusion. Order of presentation of these two sets was counterbalanced. The experimenter collected answer sheets with evaluations of the first set of traits, before evaluating the second set of traits. A full list of traits is presented below, with corresponding means and standard deviations (see Table 2).

Table 2. Means, standard deviations (in parentheses) of evaluated strength of belief in a given inferential rule, depending on the order in which a given trait was a premise or a conclusion; reliability estimated for averaged indexes.

	Type	1 then 2		2 then 1		α
		M	*SD*	*M*	*SD*	
Complementary rules		3.55	(1.32)	3.56	(1.34)	.91
if gawky then warm	LCHW	3.82	(2.19)	3.35	(2.29)	
if dull then caring	LCHW	3.54	(1.90)	3.41	(1.99)	
if friendly then naive	HWLC	4.39	(2.30)	4.49	(2.41)	
if helpful then incompetent	HWLC	2.94	(1.64)	3.25	(1.71)	
if snippy then capable	LWHC	3.05	(1.73)	3.37	(2.02)	
if crude then clever	LWHC	4.20	(2.04)	4.20	(2.14)	
if brilliant then unkind	HCLW	2.92	(1.66)	2.93	(1.71)	
if competent then unfeeling	HCLW	3.54	(1.92)	3.51	(2.07)	
Baseline rules		5.70	(1.41)	5.35	(1.41)	.70
if brainy then perceptive	HCHC	5.75	(2.28)	5.65	(2.05)	
if protective then kind	HWHW	6.39	(1.65)	6.02	(1.89)	
if insensitive then unfriendly	LWLW	5.45	(2.37)	5.08	(2.53)	
if thoughtless then unintelligent	LCLC	5.24	(2.32)	4.65	(2.22)	
Negative rules		3.10	(1.46)	2.99	(1.33)	.73
if slow-witted then cold	LCLW	3.43	(1.82)	3.01	(1.61)	
if unfriendly then sluggish	LWLC	2.79	(1.61)	2.98	(1.81)	
Positive rules		4.74	(1.54)	4.66	(1.80)	.77
if helpful then intelligent	HWHC	4.85	(2.01)	4.95	(2.21)	
if bright then benevolent	HCHW	4.63	(1.88)	4.36	(1.91)	
Contradictory		2.26	(1.30)	2.41	(1.27)	.75
if gifted then unintelligent	HCLC	2.51	(1.78)	2.82	(1.73)	
if kind then heartless	HWLW	2.00	(1.32)	1.98	(1.22)	

Note: L – low; H – high; W – warmth; C – competence, e.g. HWLC - high warmth low competence; LWHW – low warmth high warmth

Results and discussion

At the beginning, we tested whether participants perceived the relationship between traits in a complementary way, as the existence of the complementary rule is crucial for further analysis. We assumed that complementary pairs should be at least stronger from the evaluations of contradictory pairs of traits, and possibly also stronger than positive and negative rules. Baseline rules should be the strongest.

Evaluations from both sets of traits were averaged, separately for baseline (α = .70), complementary (α = .91), positive (α = .77), negative (α = .73), and contradictory pairs

(α = .75). Subsequently, we conducted a multivariate analysis of variance (MANOVA) with one within-subjects variable: (5) type of rule (baseline, complementary, positive, negative, contradictory).

The model was significant ($F(4,81) = 78.60$, $p < .001$, $\eta^2 = .80$). Specific comparisons demonstrated that: evaluations of complementary pairs of traits were significantly higher as compared to contradictory pairs ($t(84) = 9.08$, $p < .001$, $d = 1.01$), and negative pairs ($t(84) = 4.23$, $p < .001$, $d = .40$); and significantly lower than positive pairs ($t(84) = 6.30$, $p < .001$, $d = .82$) and baseline traits ($t(84) = 12.26$, $p < .001$, $d = 1.56$). In other words, participants declared that they believe to some extent in complementary rules: on average, they believed stronger in such rules, than that one negative trait implies another negative trait on opposite dimension; but also on average weaker than that one positive trait on one dimension implies positive trait on opposite dimension.

We conducted the regression analysis in order to test hypotheses that there is a positive correlation between the CE with belief in complementary rules (hypothesis 1), and that this relationship is stronger for people high (vs. low) in NFCC (hypothesis 2).

The CE was operationalized using difference scores as Kervyn, Judd, & Yzerbyt (2009) suggested. Thus, index of differentiation between groups on warmth dimension was calculated as mean evaluation of business school students subtracted from evaluation of culinary school students on warmth. Index of differentiation between groups on competence dimension was calculated as mean evaluation of culinary school students subtracted from evaluation of business school students on competence. So, positive value of differentiation index on warmth means that culinary school students were evaluated higher than business school students in terms of warmth, while for competence index positive value means that business school students were evaluated higher than culinary school students in terms of competence. Thus, the positive relation between these two indexes indicates the CE (the

more culinary school students were differentiated from business school students on warmth, the more business school students were differentiated from culinary school students on competence). Mean values for these indexes were: for differentiation on warmth (*M* = .98; *SD* = 1.12), and for differentiation on competence (*M* = 1.42; *SD* = 1.12).

Complementary rule index was formed as a proportion of average evaluations of complementary pairs divided by average evaluations of baseline pairs. Index was formed in this way, in order to control participants individual tendency in using the scale. The higher the value of this index, the stronger one's belief in complementary rule, as compared to baseline evaluations. Baseline evaluation is interpreted as a degree, to which one's on average agreed, that having trait of a given valence (e.g., positive), on given dimension (e.g., competence) implies that given person has also trait of the same valence on the same dimension (e.g., other positive trait on dimension of competence). Value of the complementary rule index which equals .5 means that on average a given person believed in complementary rules half as strong, as she/he believed that having a given trait implies having similar trait (of the same valence, on the same dimension of social perception). Mean value for this index was (*M* = 0.64; *SD* = 0.27).

Two other indexes were formed in the same way: proportion of positive traits and baseline traits, and proportion of negative traits and baseline traits. We analyzed these indexes in order to rule out a possibility that the obtained effects are due to strength of any rules, and not complementary rule.

We predicted that the CE is stronger among people who held stronger (vs. weaker) belief in complementary rule in general, and that this relationship will be stronger among people high (vs. low) in NFCC. Hence, we expected both a two-way interaction between complementary rule index and predictor (i.e., differentiation on competence dimension), and a three-way interaction between complementary rule index, predictor, and NFCC. The

dependent variable was differentiation on warmth dimension. In addition, we controlled for the evaluations on morality dimension.

All variables were standardized before the analysis. The model was significant ($F(10,45) = 5.95$, $p < .001$, $R^2 = .42$). Morality evaluation of both culinary school students ($\beta = .50$; $t = 5.06$, $p < .001$), and business school students ($\beta = -.47$; $t = 4.87$, $p < .001$), were statistically significant. Also, a three-way interaction was statistically significant ($\beta = .27$; $t = 2.40$, $p = .019$). Two-way interaction, while controlling for the influence of morality evaluations, was not statistically significant, but went in predicted direction ($\beta = .20$; $t = 1.50$, $p = .130$). Without controlling the morality evaluations, interaction was significant ($\beta = .37$; $t = 2.36$, $p = .021$). The interaction (controlling for the morality evaluations) is depicted on Figure 2.

Figure 2. Regression lines showing the differentiation between culinary schools and business schools on dimension of warmth, as a function of differentiation between these groups on dimension of competence, NFCC and degree of belief in a complementary rule.

Simple slope analysis indicated that for high belief in complementary rule, there is positive relationship between competence differentiation index, and warmth differentiation index among high NFCC participants (β = .55; t = 2.25, p = .027), but not among low NFCC participants (β = -.24; t = 1.07, p = .289). For low belief in complementary rule, reversely, there is the negative relationship between competence differentiation index and warmth differentiation index among participants high in NFCC (β = -.38; t = 1.93, p = .072), and among low in NFCC participants (β = -.09; t = .48, p = .633).

We performed a comparison of differences between slopes coefficients (Cohen, Cohen, West, & Aiken, 2003). Participants with high NFCC, and high belief in complementary rule, demonstrated the CE significantly stronger as compared to: people low in NFCC with strong belief in complementary rule (Z = 2.28; p = 0.025), people low in NFCC with low belief in complementary rule (Z = 2.00; p = 0.050), and people high in NFCC with low belief in complementary rule (Z = 2.47; p = 0.016).

The same analysis was performed using proportion of positive traits and baseline traits, and proportion of negative traits and baseline traits, instead of complementary rule index (proportion of complementary traits and baseline traits). We did not find any significant effects, despite the evaluations on morality.

To sum up, the results of the study revealed that among participants who believed in compensatory rule, only people high in NFCC demonstrated the CE. It is consistent with previous results (e.g., Jaśko, Czernatowicz–Kukuczka, Kossowska, & Czarna, 2015; Kruglanski et al., 2009), showing that high NFCC people are more prone to follow the rule. The experiment also established that the obtained effects are not just an artifact, because we didn`t find the same pattern of results when instead of complementary pairs of traits, positive or negative pairs of traits were used. Thus, results of this experiment provided support for one of the assumptions of the model tested in this thesis, namely that the CE is

an application of previously learned knowledge regarding the negative relation between dimensions of warmth and competence.

2.2. Pilot study 1, for experiment 2

In this study we tested procedure that we used in experiment 2. In this experiment we used artificial groups instead of the real one in order to test hypothesis that the CE is positively related to NFCC.

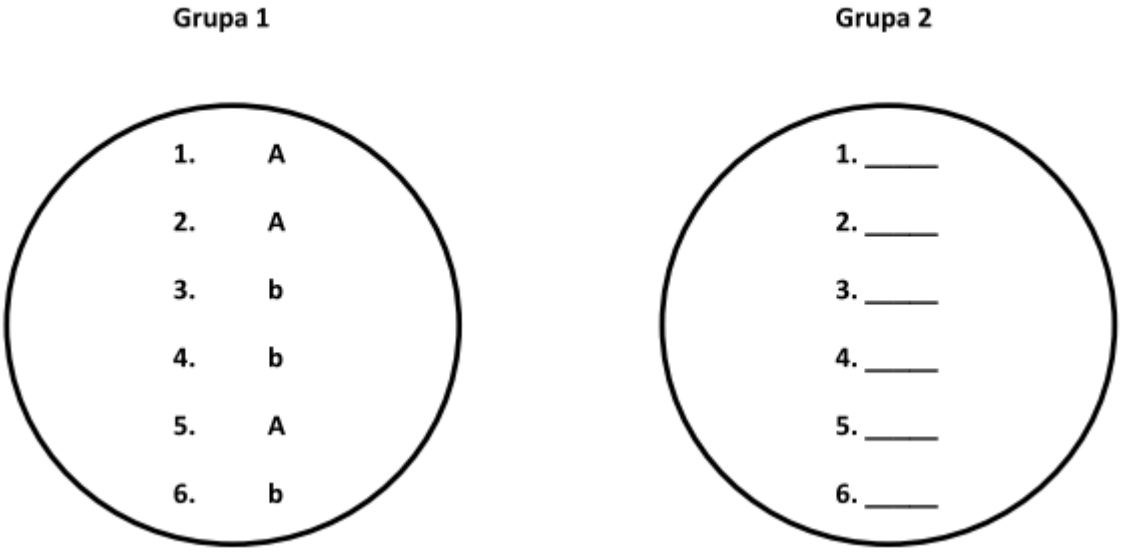
Participants

Twenty seven second year psychology students participated in the experiment on a voluntarily basis (20 women, 7 men; *M* age = 20.31).

Materials and procedure

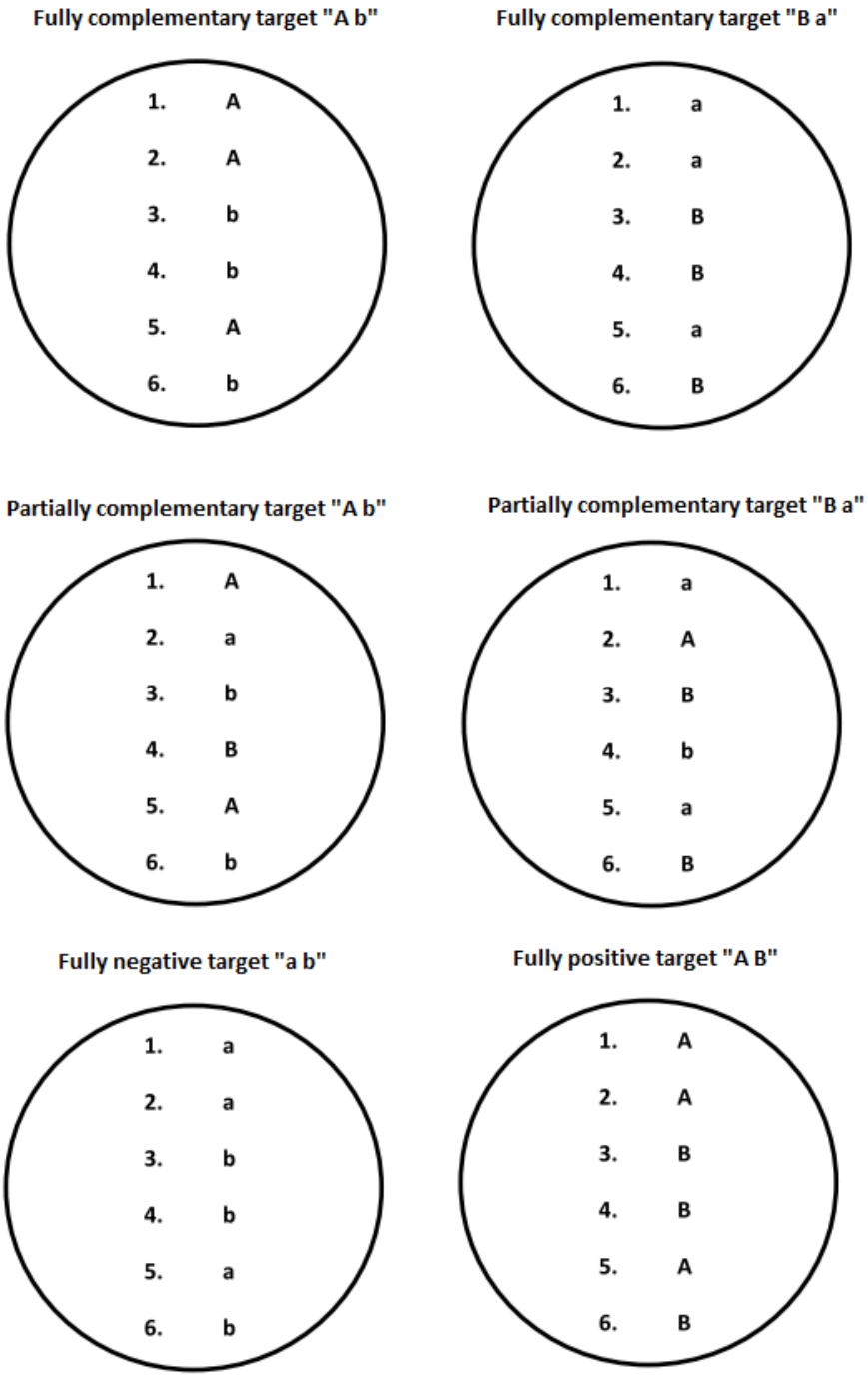
At the beginning of the session participants were informed that they will be presented with the information about pairs of groups. It was said that experts, specially trained judges, evaluated pairs of different groups using two dimensions. Dimensions were described as follow: "A" consisted of such traits as being warm, friendly or helpful, and dimension "B" consisted of such traits as being competent, skillful or intelligent. Participants were informed that experts assessed whether a trait from a given dimension can characterize given group or not. Based on assessment of one group, participants were asked to guess how judges evaluated other group. Subsequently, participants were presented with the schematic representation of evaluations (Figure 3).

Figure 3. Example of schematic group representation (one of six within-subjects condition), used in pilot study 1. In this example: fully complementary target that has only positive characteristics on dimension A, while only negative on dimension B.



Participants were informed, that capital letters "A" and "B" represent a fact that a trait from a given dimension was observed by a judge in a given group, while "a" and "b" represent a fact that trait from a given dimension was not observed at all. There were six different within-subjects conditions: two fully complementary groups (group described as having only positive characteristics on one dimension, and only negative characteristics on a second dimension), from which one was presented as high on dimension "A", while low on "B", and second as high on "B", while low on "A"; two groups were partially complementary (group having mostly – two out of three – positive characteristics on one dimension, and mostly negative on a second dimension), from which one was presented as predominantly high on dimension "A", while predominantly low on "B", and second as predominantly high on "B", while predominantly low on "A"; and two groups were not complementary (group having only positive characteristics on both dimensions, or only negative characteristics). In every case, group was described using three letters from dimension "A", and three from dimension "B". A full set of six schematic representations used in a pilot study 1 is presented below on Figure 4.

Figure 4. Schematic representations (six within-subjects condition), used in pilot study 1.



Finally, participants were asked whether they have any comments to the research. After the experiment participants were debriefed.

Results and discussion

Firstly, participants responses were separately coded for dimensions "A" and "B". If a participant ascribed upper case letter to a given group (which indicated that a given group

was perceived as high on a given dimension), such response was coded as 1. If instead, she/he ascribed a lower case letter to the group (indicated that group was low on a given dimension), such response was coded as -1. Thus, because the number of possible evaluations for each group was six, possible range of such created indexes was from -6 (only small letters on only one dimension, i.e., 6 x "a") to 6 (only capital letters on only one dimension, i.e., 6 x "A"). The higher was the value of an index, the higher a group was perceived on a given dimension. For each participant there were overall twelve such indexes: two indexes (for dimensions "A" and "B") for each of six evaluated groups.

In this study, the CE was indicated by the evaluation of the group in a compensatory direction to the target group. In other words, when a target group was described as high on one dimension ("A"), and low on the second ("b"), the evaluated group should be characterized as lower on the first dimension (more "a" than "A"), as compared to the second dimension (more "B" than "b"). We expected higher evaluation on first dimension ("A"), as compared to the second dimension ("B"), when target group is low on first dimension, and high on the second dimension. Conversely, we expected the lower evaluation on the first dimension ("A") (vs. second dimension, "B"), when target group is high on first dimension, and low on the second. We expected that such pattern will occur for fully, as well as partially complementary targets, and will not occur when a target group is presented as purely negatively evaluated nor purely positively evaluated.

In order to test the hypotheses we conducted a multivariate analysis of variance (MANOVA) with two within-subjects variables: (2) dimension (dimension "A", dimension "B"), (6) target group (fully complementary "a B", fully complementary "A b", partially complementary mostly "a B", partially complementary mostly "A b", purely positive "A B", purely negative "a b").

The only significant effect was the interaction between dimension and target group ($F(5,22) = 6.67$, $p = .001$, $\eta^2 = .60$).

Specific comparisons confirmed that for fully complementary target "A b", a group tended to be perceived as lower on "A" dimension, as compared to "B" ($t(26) = 1.40$, $p = .087$, $d = .51$). For fully complementary target "B a", the pattern of results reversed – group was perceived higher on dimension "A", than "B" ($t(26) = 2.00$, $p = .029$, $d = .74$). Same pattern occurred for partially complementary targets: ($t(26) = 4.12$, $p < .001$, $d = 1.01$) for "A b" target, however for "B a" target effect was insignificant ($t(26) = .89$, $p = .193$, $d = .30$). When target was purely negative, there were no significant differences ($t(26) = .89$, $p = .381$, $d = .13$). Inconsistently with our expectations, we found significant differences for fully positive target ($t(26) = 2.21$, $p = .036$, $d = .33$), in this case, a group was evaluated higher on dimension "A" (warmth) than "B" (competence). Means and standard deviations are presented below in Table 3.

Table 3. Means and standard deviations (in parentheses) of evaluations of given target group, on dimensions "A" and "B".

	Dimension "A"		Dimension "B"	
	M	*SD*	*M*	*SD*
Fully complementary target "A b"	-.22	(2.44)	.89	(1.91)
Fully complementary target "B a"	.81	(2.00)	-.74	(2.21)
Partially complementary target "A b"	-.44	(1.31)	.74	(1.02)
Partially complementary target "B a"	.04	(1.58)	-.41	(1.37)
Fully negative target "a b"	.52	(2.61)	.22	(2.10)
Fully positive target "A B"	.19	(2.08)	-.48	(2.03)

In all four complementary conditions pattern of results was consistent with expectations. Finally, we analyzed participants comments on the experiment. The analysis resulted in a conclusion that most of participants were uncertain about their objectives in the task. Therefore, in experiment 2 we decided to include additional training session, in order to establish that participants fully understand the task.

2.3. Experiment 2

In experiment 2 we tested the hypothesis that the CE emerges among people with high (vs. low) NFCC (hypothesis 3). A design of the experiment was the same as in pilot study 1.

Participants

The experiment was conducted online and involved 47 (32 women, 15 men; *M* age = 23.21, *SD* = 3.61) users of an online research panel (ResearchOnline), who answered all the questions in the questionnaire, and proved that they understand the task[3]. Participants received 5 PLN for completing the questionnaire.

Materials and procedure

All materials were exactly the same as in pilot study 1 (except training session and additional questions that verified whether participants understand what was their task).

Firstly, participants answered a short version of NFCC scale (Kossowska, Hanusz, & Trejtowicz, 2012; Webster & Kruglanski, 1994). As in experiment 1, we used three subscales in further analyses. Reliability of the scale was α = .76. Items were averaged into an index of NFCC (*M* = 4.13; *SD* = .63).

Secondly, participants read an instruction identical as in pilot study 1. Subsequently, participants took part in a training session. Participants familiarized themselves with symbolic representation of a target group (which was the same as in pilot study 1 – figure 4), to which an additional explanation was provided. Next, participants answered three questions, by which we tested whether they interpret the evaluation of a given target group correctly (e.g. that fully complementary target "A b" was evaluated as a group that is definitely warm, friendly, but also as definitely incompetent, unintelligent). After each question participants

[3] 60 participants answered all the questions, but 13 of them failed to prove that they understand the task and were therefore excluded from further analyses.

received information, whether they answered it correctly or not, and which answer was correct and why. Also, after each question, participants were asked whether they feel that they understand their task. Before the main part of the research, participants read instruction one more time. Subsequently, participants evaluated six groups, same as in pilot study 1. Same as in pilot study, the order of presentation was counterbalanced.

Further analyses included only participants who responded correctly to last two questions in a training session.

Results and discussion

We coded and analyzed participants responses identically as in pilot study 1.

In order to test whether the CE occurred and in which conditions, we conducted a multivariate analysis of variance (MANOVA) with two within-subjects variables: (2) dimension (dimension "A", dimension "B"), (6) target group (fully complementary "a B", fully complementary "A b", partially complementary mostly "a B", partially complementary mostly "A b", purely positive "A B", purely negative "a b").

As in pilot study, only significant effect was the interaction term between dimension and target group ($F(5,42) = 4.71$, $p = .002$, $\eta^2 = .36$).

Specific comparisons showed that, as before, consistently with what we expected, for fully complementary target "A b", group was perceived as lower on "A" dimension, as compared to "B" ($t(46) = 2.34$, $p = .012$, $d = .66$). When fully complementary target "B a" was presented, group was perceived higher on dimension "A", than "B" ($t(46) = 3.88$, $p < .001$, $d = 1.09$).

The same pattern occurred for partially complementary targets, and this time the effect for both targets was statistically significant: target "A b" ($t(46) = 4.53$, $p < .001$, $d = 1.13$), as well as target "B a" ($t(46) = 3.99$, $p < .001$, $d = .93$).

This time, also as expected, there were no significant differences when target was purely negative ($t(46) = 1.00$, $p = .323$, $d = .06$), nor when it was purely positive ($t(46) = .57$, $p = .569$, $d = .01$).

Means and standard deviations are presented below in Table 4.

Table 4. Means and standard deviations (in parentheses) of evaluations of given target group, on dimensions "A" and "B".

	Dimension "A"		Dimension "B"	
	M	*SD*	*M*	*SD*
Fully complementary target "A b"	-.72	(2.69)	1.06	(2.37)
Fully complementary target "B a"	1.60	(2.36)	-1.04	(2.48)
Partially complementary target "A b"	-.47	(.95)	.72	(1.14)
Partially complementary target "B a"	.83	(1.15)	-.28	(1.15)
Fully negative target "a b"	.91	(2.64)	1.09	(2.64)
Fully positive target "A B"	-.70	(2.71)	-.66	(2.72)

In order to test hypothesis regarding the positive relation between NFCC and occurrence of the CE, we calculated a compensatory perception index, by summing the evaluations in a way that high value of the index indicated the occurrence of the CE. That calculation involved coding the responses in relation to the target: for target "A b", responses "a" and "B" were coded as 1, while responses "A" and "b" as -1. Reversely, for target "B a". Index ranged from -6 to 6. Subsequently, we conducted correlation analysis between NFCC and compensatory perception index, separately for each of four complementary conditions (fully complementary, and partially complementary). The occurrence of positive correlation was expected (the higher the NFCC, the higher compensatory perception index).

Results supported predictions for fully complementary targets. For fully complementary target "A b", correlation was positive ($r(47) = .332$, $p = .012$), and the same for fully complementary target "B a" ($r(47) = .316$, $p = .015$). Correlations for partially complementary targets, were statistically insignificant: ($r(47) = .032$, $p = .829$) for "A b" target, and ($r(47) = .125$, $p = .404$) for "B a" target.

The CE occurred, and as predicted, was positively related with NFCC (the higher the NFCC, the stronger the CE). Therefore, the general hypothesis regarding positive relation between epistemic motivation and the CE found support, at least for targets that were unambiguously presented as high on one fundamental dimension and low on the other. Perhaps direct presentation of targets in a more diverse way, did not allow high NFCC participants to make clear categorization as "competent and cold"/"incompetent and warm", therefore they were less prone to use the compensatory strategy. In next experiments instead of artificial groups described with set of traits we used natural groups, assuming that in this way high NFCC participants will make categorizations based on stereotypical beliefs regarding position of evaluated groups on dimensions of warmth and competence. Thus, applying complementary rule to evaluated objects can be easier for high NFCC participants.

2.4. Pilot study 2 for experiments 3 and 4

In experiments 3 and 4, we used a procedure similar to described by Kervyn, Yzerbyt, Demoulin, & Judd (2008). Participants evaluated two nationalities on dimensions of warmth and competence. The target nationality was the nationality of participants, comparison nationalities were either low on competence/high on warmth, or high on competence/low on warmth dimensions. On a basis of previous research (e.g., Dolińska & Fałkowski, 2011), Germans were chosen as a nationality perceived in Poland as competent and cold. In order to choose national group stereotypically perceived as warm but incompetent, we conducted a pilot study. Basing on existing research report (CBOS, 2013), two countries were chosen to be tested as a potential comparison group: Spain and Czech Republic.

Moreover, in experiments 3 and 4, we manipulated the consistency/inconsistency of provided information with previous knowledge and expectations. In both experiments, we provided information regarding position of a given national group on dimension of warmth. In both experiments the manipulation involved providing information that a given nationality is particularly high on this dimension (that nationality in Euro-wide research was evaluated

as the warmest). In the pilot study we also tested the effectiveness of such manipulation (how much information regarding given nationality was expected/surprising for participants).

Participants & Procedure

Study was conducted online on the group of 50 users of online research panel (ResearchOnline). Participants received 3 PLN for completing the questionnaire.

Participants were asked, to rate people from Spain and from Czech Republic on three items related to warmth dimension (warm, friendly, helpful), and three items related to competence dimension (competent, capable, intelligent). Participants answered on a seven-point scale (1 = not at all; 7 = very much). Following Fiske and colleagues (2002) concerns about social desirability, and aiming to capture more broad societal perceptions, the same indirect instruction was used. Participants were asked how the groups are perceived by Polish society ("*To what extent, in your opinion, people in Poland perceive people from [Spain, Czech Republic] as…*"). Order of presentation of given nationality was counterbalanced. Reliabilities for the scales were: Spain warmth α = .72; Spain competence α = .88; Czech Republic warmth α = .77; Czech Republic competence α = .89. Items related to a given dimension were averaged into an index.

After rating two nationalities, participants were asked: *To what extent would you be surprised*, *if you would find out that in Euro-wide research a given nationality was chosen as one of the most likable in Europe?* In the next question, participants were asked how much this would be expected. Participants answered on a seven-point scale (1 = not at all; 7 = very much), rating people from six countries: Spain, Czech Republic, Germany, Poland, England, and the Netherlands. Three latter countries were added as a reference point (people from England are also perceived in Poland as one of the most likeable nations, and people from Netherlands as one of the most competent).

Results & Discussion

In order to test differences between evaluations of people from Spain and Czech Republic, a multivariate analysis of variance (MANOVA) was conducted with 2 within-subjects variables: (2) group (Spain, Czech Republic) and (2) dimension (warmth, competence). All effects were significant: main effect of group ($F(1,49) = 7.62$, $p = .008$, $\eta^2 = .14$), main effect of dimension ($F(1,49) = 83.42$, $p < .001$, $\eta^2 = .62$) and the interaction effect ($F(1,49) = 9.52$, $p = .003$, $\eta^2 = .16$). Means and standard deviations are shown in Table 5.

Table 5. Means and standard deviations (in parentheses) of evaluations of people from Spain and Czech Republic, on dimensions of warmth and competence.

	Warmth		Competence	
	M	*SD*	*M*	*SD*
Spain	4.74	(.91)	3.41	(1.02)
Czech Republic	4.82	(1.05)	4.12	(1.01)

Specific comparisons demonstrated that there are no differences in evaluation on warmth dimension ($t(49) = .52$, n.s.), but people from Czech Republic were evaluated higher on dimension of competence, than people from Spain ($t(49) = 3.63$, $p = .001$, $d = .70$).

In order to test the extent, to which information regarding high position of a given nationality on warmth dimension would be surprising for participants, as compared to being expected, again a multivariate analysis of variance (MANOVA) was conducted with 2 within-subjects variables: (6) group (Spain, Czech Republic, Germany, England, Netherlands, Poland) and (2) expectation (expected, surprising). It occurred that there was significant main effect of group ($F(5,49) = 5.25$, $p = .026$, $\eta^2 = .10$), and the interaction effect ($F(5,49) = 35.06$, $p < .001$, $\eta^2 = .42$). Means and standard deviations are shown in Table 6.

Table 6. Means and standard deviations (in parentheses) of expectation regarding information, that given nationality is high on warmth dimension.

	Expected		Surprising	
	M	*SD*	*M*	*SD*
Spain	5.18	(1.79)	2.06	(1.28)
Czech Republic	4.42	(1.74)	2.62	(1.41)
Germany	2.42	(1.63)	5.76	(1.56)
England	3.38	(1.47)	4.48	(1.54)
Netherlands	3.94	(1.63)	3.22	(1.57)
Poland	3.74	(1.68)	4.42	(1.90)

Specific comparisons with Bonferroni's correction established that information claiming that given nationality is perceived as one of the warmest nationality in Europe was significantly more surprising than expected, when it referred to people from Germany ($t(49) = 9.25$, $p < .001$, $d = 2.09$), and from England ($t(49) = 3.04$, $p = .004$, $d = .73$). Such information was more expected than surprising for people from Spain ($t(49) = 8.31$, $p < .001$, $d = 2.01$), and Czech Republic ($t(49) = 4.82$, $p < .001$, $d = 1.14$). There were no significant differences for people from Netherlands ($t(49) = 1.74$, $p = .10$, $d = .44$) and from Poland ($t(49) = 1.54$, $p = .13$, $d = .38$).

For the purpose of further experiment, we needed nationality that is perceived as warm but incompetent as a comparison group. Based on the results from pilot study we choose Spain which is perceived as warm, but less competent than Czech Republic. Moreover, information that people from Spain are perceived as one of the warmest from all European countries was most expected, what indicates that Spain is a proper comparison group for further study (as warm and incompetent target, for which information about high position on warmth dimension will be consistent with stereotypical expectations; consistent with previous knowledge). Thus, Spanish nationality was used as a comparison group in next study.

Moreover, results of the pilot study provided evidence that information about high position on warmth dimension would be least expected when it refers to people from

Germany. Thus, we choose German nationality as a high competence, low warmth comparison group, for which information about high position on dimension of warmth will be incongruent with previous knowledge.

2.5. Experiment 3

The aim of the experiment 3, was to test whether the CE will be stronger among people with high NFCC as compared to low in NFCC (hypothesis 3). We assumed that when participants obtain information that is consistent with their previous knowledge, they rely on their preferred way of information processing. The same is expected when none information is provided: in both situations participants should act accordingly to their stereotypical knowledge and information processing style, i.e., the CE should emerge to a greater extent among high as compared to low NFCC participants.

Participants

The experiment was conducted online. Seventy one users of an online research panel (ResearchOnline) (52 women, 19 men; *M* age = 27.31, *SD* = 8.27), filled the questionnaire and read the experimental manipulation[4]. Participants received 3 PLN for completing the questionnaire.

Materials and procedure

Firstly, participants completed a short version of NFCC scale (Kossowska, Hanusz, & Trejtowicz, 2012; Webster & Kruglanski, 1994). As before three subscales were used. Reliability of the scale was α = .83. Items were averaged into an index of NFCC (*M* = 4.11; *SD* = 0.70).

[4] 80 participants answered all the questions, but 9 of them failed to prove that they familiarize themselves with experimental manipulation. Thus, they were excluded from further analyses.

Secondly, participants were randomly assigned to one of two conditions: experimental and control. In both of them, participants were asked to read presented information carefully. In experimental condition, participants read a following information:

> *Research of Eurobarometer is a representative research of public opinion, organized on behalf of the European Commission. In the last research on "self portrait" of Europeans, participated 40 000 citizens from all member countries of the European Union. This research, among other issues, investigated what citizens of member countries of the European Union think about each other. In one of the questions, respondents were asked to choose "the most likeable nationality in the European Union". Respondents could not vote for their own country (e.g. people from Poland could not vote for Poles, etc.). Results of the research clearly ascertained that among Europeans the most likeable nation in the European Union is Spanish (64% of respondents voted for people from Spain, from 27 possible countries). The goal of the research, in which you are currently participating, is an additional study of the findings from research of Eurobarometer, regarding two nationalities.*

In the control condition, the provided information was exactly the same, only the part underlined in the paragraph above was skipped.

Subsequently, participants evaluated people from Spain and Poland on dimensions of warmth, competence, and morality. Participants were using seven-point scale (1 = not at all; 7 = very much), and as before, they were asked how evaluated groups are perceived by the Polish society. A presentation of a given nationality was counterbalanced. Reliabilities for the scales were: Spain warmth α = .88; Spain competence α = .83; Spain morality α = .84; Poland warmth α = .85; Poland competence α = .86; Poland morality α = .85. The items related to a given dimension were averaged into an index.

Afterwards, participants from experimental condition answered two questions that assessed effectiveness of manipulation (consistency with previous stereotypical knowledge). Participants answered two questions (1 = not at all; 7 = very much): to what extent the above described results of the Eurobarometer research were surprising and to what extent expected.

Furthermore, participants assessed their identification with their country on a seven-point scale, using pictorial measure similar to method described by Swann, Gómez, Seyle, Morales, & Huici (2009). Because one of the evaluated groups was the national group of participants, their identification with a country might affect the evaluations. Thus we controlled for the strength of identification in order to rule out its influence (M = 4.21; SD = 1.72).

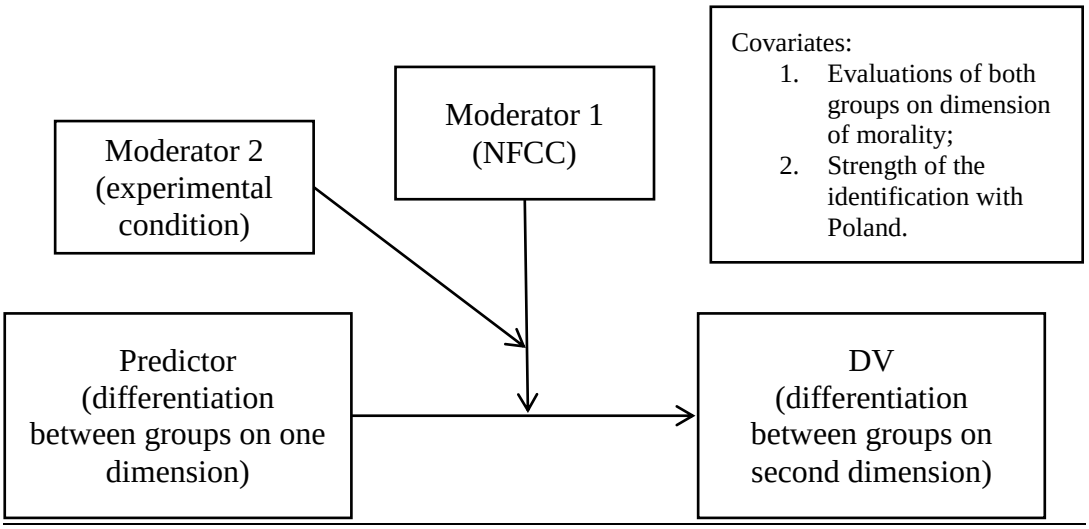
Finally, all participants answered two questions that assessed whether they read the cover story. Because study was conducted online thus control over participants is limited. Therefore it was important to incorporate an additional indices that allow to distinguish between reliable and unreliable participants. All participants were asked how many people took part in the Eurobarometer research, and additionally, participants from experimental condition were asked which nationality according to the presented results was indicated as the most likable in the survey. Nine participants failed to answer these questions (8 from the experimental condition, and 1 from the control condition), and were excluded from further analyses. All of these participants spent also significantly lower amount of time to complete the survey, as compared to average time. After completing the questionnaire, participants were fully debriefed.

The CE was assessed as in experiment 1, using indexes of differentiation between groups on a given dimension. For warmth dimension, mean evaluation of Poles was subtracted from evaluation of Spanish people. For competence dimension, evaluation of Spanish people was subtracted from Poles evaluation on this dimension. So, for warmth

dimension, positive value of differentiation index means that Spanish people were evaluated higher than Poles, while for competence dimension positive value means that Poles were evaluated higher than Spanish people. Thus, the positive relation between these two indexes indicates that the CE occurred. Mean values for these indexes were: for differentiation on warmth dimension (M = 1.31; SD = 1.27), and for differentiation on competence dimension (M = .48; SD = 1.51).

It was predicted, that when there is no inconsistency (provided information is consistent with previous knowledge, or information is neither consistent nor inconsistent as in control condition), the CE will be stronger among high NFCC people as compared to low NFCC people. Hence, we didn`t expect any differences between experimental and control condition. However, we expected the interaction between predictor (differentiation on manipulated dimension, i.e., warmth) and NFCC. The dependent variable was the differentiation on competence dimension, the predictor was differentiation on warmth dimension. In addition we controlled for evaluations on morality dimension and strength of the identification with Polish nationality. Analytical model is depicted below (Figure 5). Although in this experiment we did not predict that a three-way interaction will be significant (we assumed that experimental manipulation will not affect on participants tendency to use their preferred way of information processing), we tested this possibility.

Figure 5. Schematic representation of an analytical model in experiment 4 and 5.



Results & Discussion

Firstly, we examined the effectiveness of the manipulation. As predicted, an information about high position of Spanish nationality on dimension of warmth was statistically significantly more expected (M = 5.03; SD = 1.60), than surprising (M = 2.69; SD = 1.58) ($t(31) = 4.48$, $p < .001$, $d = 1.47$). This means that participants perceived provided information as consistent with their previous knowledge, thus the manipulation induced experience of consistency.

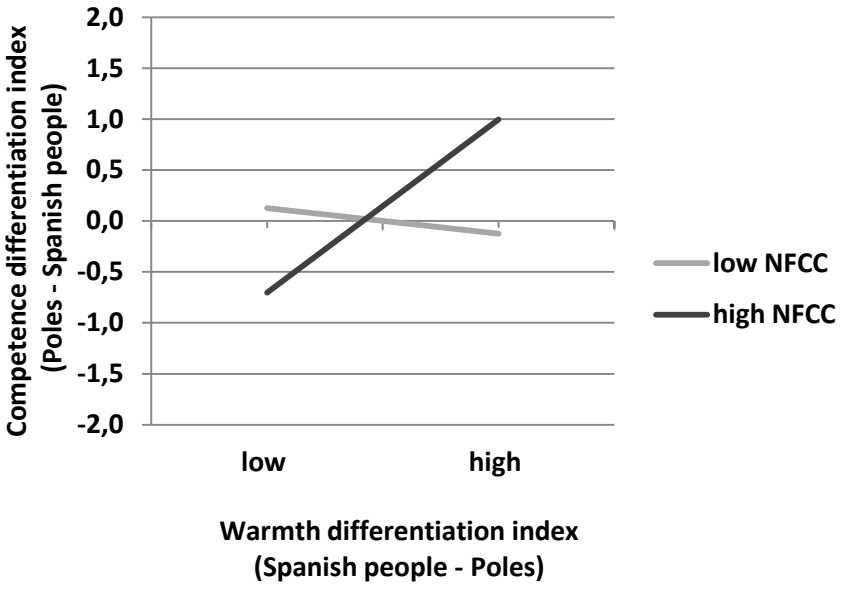
A mean evaluations of Poles, and people from Spain, on dimensions of warmth, competence, and morality, are presented in Table 7. Because of the fact that differences in evaluations are not directly related with the hypothesis tested in this experiment, statistical tests of these differences were not conducted.

Table 7. Means and standard deviations (in parentheses) of evaluations of people from Spain and people from Poland, on dimensions of warmth, competence, and morality.

Condtion		Evaluation					
		Warmth		Competence		Morality	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*
Control	39						
Spanish people		4.91	(.92)	3.46	(.77)	4.15	(.83)
Polish people		3.99	(1.18)	4.12	(1.22)	3.71	(1.28)
Experimental	32						
Spanish people		5.30	(1.24)	3.83	(1.13)	4.34	(1.23)
Polish people		3.53	(1.27)	4.10	(1.58)	3.32	(1.30)

In order to test a model presented in Figure 5, regression analysis was performed. All variables were standardized before analysis. Whole model was significant ($F(10,59) = 3.16$, $p = .003$, $R^2 = .35$). All control variables turned out to be significant: morality evaluation of Poles ($\beta = .43$; $t = 3.51$, $p = .001$), morality evaluation of people from Spain ($\beta = -.32$; $t = 2.74$, $p = .008$), strength of identification ($\beta = .23$; $t = 1.90$, $p = .062$). Also, the main effect of warmth differentiation index was marginally insignificant ($\beta = .36$; $t = 1.78$, $p = .082$). As predicted, interaction term between NFCC and warmth differentiation index was statistically significant ($\beta = .49$; $t = 2.37$, $p = .021$). The interaction is depicted on Figure 6.

Figure 6. Regression lines demonstrate the differentiation between Poles and Spanish people on the dimension of competence, as a function of differentiation between these groups on dimension of warmth and NFCC.



A simple slope analysis indicated that a positive relation between warmth differentiation index, and competence differentiation index appeared among high NFCC participants (β = .85; t = 2.40, p = .020), but not among low NFCC participants (β = -.13; t = .61, p = .544). In other words, the more people high on NFCC differentiated between people from Spain and Poles on dimension of warmth (the higher people from Spain were evaluated on dimension of warmth as compared to Poles), the more they differentiated between them on dimension of competence in opposite direction (the higher Poles were evaluated on dimension of competence as compared to people from Spain).

The results supported hypothesis 3: the CE emerged among high NFCC people, but not low NFCC people. In control, as well as in the experimental condition, participants acted in line with their preferred motivation of information processing. The fact that the CE occurred among high NFCC participants is a preliminary evidence for one of the assumptions of a theoretical model tested in this thesis: that the CE is an especially attractive tool for people, who are motivated to use heuristic processing style.

2.6. Experiment 4

In experiment 4, instead of providing information consistent with previous knowledge, inconsistent information was provided. In this experiment we tested all four hypotheses. The assumption was that in the control condition (when none information regarding evaluated groups is provided), participants will behave accordingly to their stereotypical knowledge, and preferred information processing style: the CE will occur to a greater extent among high as compared to low NFCC participants (hypothesis 3). In experimental condition, experience of inconsistency may refrain participants from using their routine way of information processing: the CE will be stronger among low as compared to high NFCC participants (hypothesis 4). Thus, comparing between conditions, people high in NFCC exhibit the CE to a greater extent, in control condition, in comparison to experimental

condition (hypothesis 5); while people low in NFCC exhibit the CE to a lesser extent, in control condition, in comparison to experimental condition (hypothesis 6)

Participants

The experiment was conducted online and involved 56 users of an online research panel (ResearchOnline) (38 women, 18 men; *M* age = 28.07, *SD* = 8.97), who answered all the questions in the questionnaire, and read the experimental manipulation[5]. Participants received 3 PLN for completing the questionnaire.

Materials and procedure

All the materials were exactly the same as in experiment 3 (except experimental manipulation), and were presented in the same order.

Firstly, participants completed a short version of NFCC scale (Kossowska, Hanusz, & Trejtowicz, 2012; Webster & Kruglanski, 1994). As previously, three subscales were used in further analyses. Reliability of the scale was α = .81. Items were averaged into an index of NFCC; the higher it is the higher need for cognitive closure (*M* = 4.18; *SD* = 0.62).

Secondly, participants were randomly assigned to an experimental or control condition. The manipulation was identical as in experiment 3, only in experimental condition, people read that the most likeable nation in the European Union are Germans.

Subsequently, participants evaluated Germans and Poles on warmth, competence, and morality, using the same items as in experiment 3. The order of a presentation of a given nationality was counterbalanced. Reliabilities for the scales were: Germans warmth α = .86; Germans competence α = .85; Germans morality α = .81; Poles warmth α = .79; Poles competence α = .86; Poles morality α = .86. Items related to a given dimension were averaged into an index.

[5] 66 participants answered all the questions, but 10 of them failed to prove that they have familiarized themselves with the experimental manipulation and therefore were excluded from further analyses.

Afterwards, same as before, in the experimental condition participants answered two questions that assessed the effectiveness of the manipulation, i.e., inconsistency with previous (stereotypical) knowledge. We asked to what extent described results of the Eurobarometer research were surprising and expected.

Then, participants assessed their identification with their country (M = 4.16; SD = 1.54), and answered to two questions that assessed whether they read the manipulation. Ten participants failed to answer to these questions (4 from the experimental condition, and 6 from the control condition), and were excluded from further analyses. After completing the questionnaire, participants were fully debriefed.

The CE, was assessed as in experiment 3, using indexes of differentiation between groups on a given dimension. For warmth dimension we subtracted mean evaluation of Germans from evaluation of Poles, and for competence dimension we subtracted evaluation of Poles from evaluation of Germans on this dimension. The sequence of subtracted elements was reversed, as compared to the previous experiment. This is because Germans are stereotypically perceived as competent and cold, thus in order to obtain indexes comparable to the experiment 3 (positive values of indexes indicating that group stereotypically perceived as high on this dimension is in fact perceived higher than the second group), sequence of subtraction was reversed. So, for the competence dimension positive value means that Germans were evaluated higher than Poles, while for warmth dimension, positive value of differentiation index means that Poles were evaluated higher than Germans. A positive relation between these two indexes would indicate the CE. Mean values for these indexes were as follow: for differentiation on warmth dimension (M = 1.20; SD = 1.32), and for differentiation on competence dimension (M = .58; SD = 1.41).

We predicted that effects will differ between the control condition and the experimental condition, where inconsistent information was provided. Hence, we expected a three way interaction: in control condition, the CE should emerge among people high in

NFCC, but not among people low in NFCC; in the experimental condition the opposite relationship should be true: CE emerges among participants low in NFCC, but not high in NFCC. A dependent variable was differentiation on warmth dimension, the predictor was differentiation on competence dimension. Also, as before, evaluations on the morality dimension and strength of the identification with Polish nationality were controlled.

Results and discussion

At first we examined the effectiveness of the manipulation. As predicted, information about high position of Germans on the dimension of warmth was statistically significantly more surprising (M = 5.07; SD = 1.36), than expected (M = 3.07; SD = 1.36) ($t(27) = 4.05$, $p < .001$, $d = 1.47$). This indicates, that participants perceived provided information as inconsistent with their previous knowledge, thus the manipulation was successful and induced experience of inconsistency.

Mean evaluations of Poles and Germans on warmth, competence, and morality, are presented in Table 8. As before, because the differences in evaluations are not directly related with hypotheses that we test, statistical tests of these differences were not conducted.

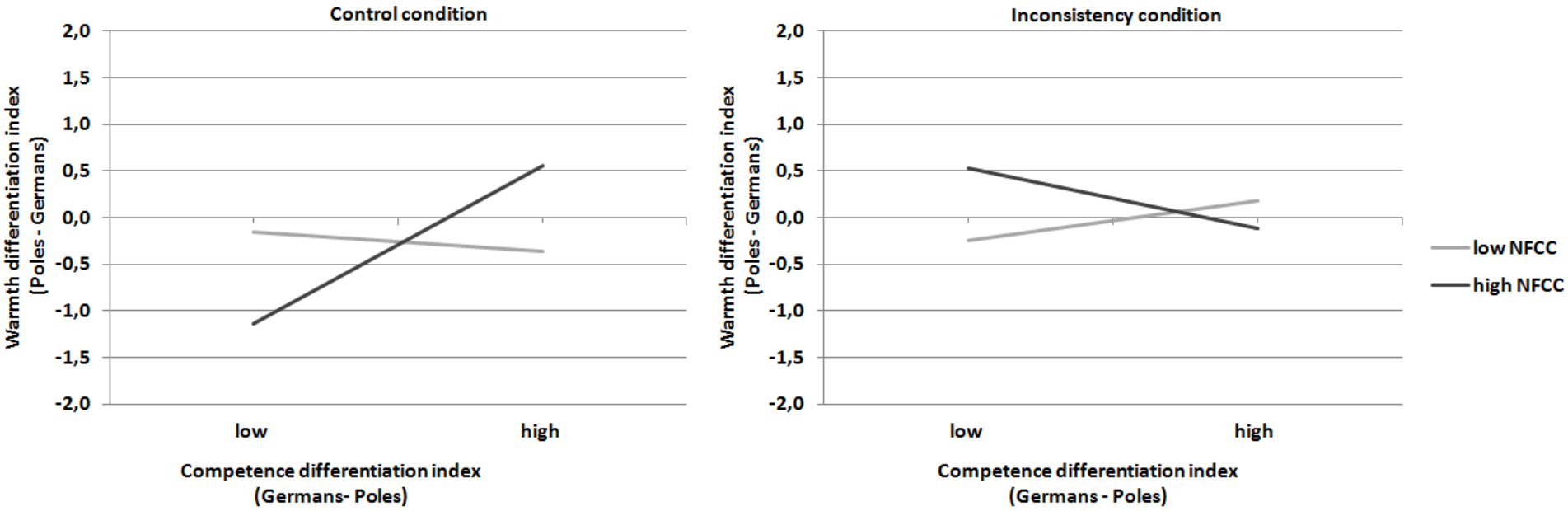
Table 8. Means and standard deviations (in parentheses) of evaluations of Germans and Poles, on dimensions of warmth, competence, and morality.

Condtion		Evaluation					
		Warmth		Competence		Morality	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*
Control	28						
Germans		2.79	(1.25)	4.77	(1.15)	3.56	(1.18)
Poles		4.10	(1.10)	4.07	(1.15)	3.96	(1.30)
Experimental	28						
Germans		2.81	(1.02)	5.00	(1.05)	4.11	(1.26)
Poles		3.88	(1.12)	4.56	(1.37)	3.48	(1.02)

As in experiment 3, an regression analysis was performed. All variables were standardized before the analysis. Model was significant ($F(10,45) = 4.59$, $p < .001$, $R^2 = .51$). Morality evaluations of both Poles ($\beta = .46$; $t = 3.28$, $p = .001$), and Germans (β = -

.43; t = 3.75, p = .002), were statistically significant, as well as an interaction between index of competence differentiation and NFCC (β = .46; t = 2.29, p = .027). As predicted, three-way interaction between NFCC, condition and competence differentiation index was statistically significant (β = -.74; t = 3.09, p = .003). The interaction is depicted on Figure 7.

Figure 7. Regression lines demonstrate the differentiation between Poles and Germans on the dimension of warmth, as a function of differentiation between these groups on dimension of competence, NFCC, and experimental condition.



A simple slope analysis indicated that in the control condition, positive relation between competence differentiation index, and warmth differentiation index, appeared among high NFCC participants (β = .85; t = 2.42, p = .020), but not among low NFCC participants (β = -.10; t = .39, p = .696). In the experimental condition, this pattern is reversed: positive, although insignificant, relation between competence differentiation index, and warmth differentiation index appeared among low NFCC participants (β = .21; t = 1.08, p = .285), but not among high NFCC participants (β = -.32; t = 1.87, p = .069).

In order to test hypotheses, we performed a comparison of differences between slopes coefficients (Cohen, Cohen, West, & Aiken, 2003). We compared these coefficients to test hypothesis 3 that in consistency (in this case control condition) the CE is stronger among people with high NFCC, as compared to people with low NFCC. The results showed that this difference was statistically significant (Z = 2.18; p = 0.017). In order to test hypothesis 4, we compared the same coefficients, in experimental (inconsistency) condition. As predicted, while experiencing inconsistency the CE was stronger among people with low NFCC, as compared to people with high NFCC (Z = 2.05; p = 0.023). We tested hypothesis 5, which states that the CE is stronger among people high in NFCC while they do not experience inconsistency, as compared to the situation when they experience inconsistency, by comparing corresponding coefficients. The results were in line with our predictions (Z = 3.00; p = 0.002). Finally, we tested hypothesis 6, that the CE is stronger among people with low NFCC while experiencing inconsistency, as compared to situation when no inconsistency is present by comparing these coefficients. In this case, the difference was not statistically significant, but went in a predicted direction (Z = .96; p = 0.171).

Our study confirmed three out of four hypotheses. Hypothesis 6, saying that people low in NFCC while experiencing inconsistency will show the CE to a greater extent as compared to people with low NFCC not experiencing inconsistency was not confirmed. Although, the pattern of results went in predicted direction.

Experiments 3 and 4 provided preliminary evidence for predictions tested in this thesis. In both of these experiments, compared groups were national groups, and the manipulation referred to the warmth dimension. Moreover, one of the evaluated groups, was the same nationality as the participants. So, however we controlled for the strength of identification with this nationality, it can be argued that some sort of ingroup processes could affect the evaluations. Thus, in order to show that the obtained effects are not specific to the context used in experiment 3 and 4, in the experiment 5 we changed group context, as well as manipulated dimension.

2.7. Experiment 5

In experiment 5, we provided control, inconsistency, and consistency conditions. We manipulated the dimension of competence, instead of warmth dimension as in previous experiments. Also, instead of national groups (and participants ingroup), real group context was used. It allows us to test generalizability of predicted effects in different context. As in experiment 4, in this study we tested all the hypotheses. Moreover, we tested the possibility that the change in perception of a given group on one dimension, can affect the change in the opposite direction on the second dimension (Kervyn, Yzerbyt, & Judd, 2010). We expected that a change in perception of the group stereotypically evaluated as low on competence, would change also the evaluation on the warmth in a way that evaluations of this group on warmth dimension should be lower. Thus, this was a repeated measure experiment, in which we measured evaluations of two groups (pretest), then participants obtained information consistent/inconsistent with previous stereotypical knowledge (experimental conditions), or none information (control condition), and again evaluated two groups (posttest). So, in this experiment, hypotheses referred not simply to the CE in a single moment of measurement, but to change in the perception of a given group[6].

[6] Moreover, because it was not certain whether the perception of a group can be changed simply by obtaining information inconsistent with previous knowledge, we included an additional manipulation. In two

Participants

In both parts of the experiment participated 105 high school students (65 women, 39 men; M_{age} = 17.37; SD = 0.55), from six classes. Classes were randomly assigned to one of three between-subjects conditions: 3 consistency (information consistent with stereotype, information inconsistent with stereotype, and control condition).

Materials and procedure

An experimenter explained students that the study contains various elements and is a component of a larger research program and consists of two parts.

In the first part, participants firstly evaluated two groups on warmth, competence and morality, using the same items as in previous experiments. First group, was a group perceived as warm and incompetent (culinary school students), second group was a group perceived as competent and cold (business school students). Order of presentation was counterbalanced. Reliabilities for the scales were: culinary school warmth α = .89; culinary school competence α = .86; culinary school morality α = .82; business school warmth α = .86; business school competence α = .81; business school morality α = .84. Items related to a given dimension were averaged into an index.

Secondly, participants completed a short version of NFCC scale (Kossowska, Hanusz, & Trejtowicz, 2012; Webster & Kruglanski, 1994). The same three subscales as in previous experiments were used in a further analyses. Reliability of the scale was α = .74. Items were averaged into an index of NFCC (M = 3.93; SD = 0.70).

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conditions, participants obtained information consistent/inconsistent with stereotypical knowledge (that given group scored very high on an intelligence test), and in two conditions in addition participants were informed that their own group scored poorly on this test. We assumed, that obtaining information that not only group perceived as incompetent scored high on intelligence test, but that group of participants scored poorly may additionally strengthen the manipulation of experience of inconsistency. In every analysis described in this study we controlled for the influence of this additional manipulation, although as it turned out, there was no significant effect associated with this manipulation, therefore for a clarity of reasoning and presentation we do not describe it later on.

Subsequently, participants answered an Importance to Identity subscale from the Collective Self-Esteem Scale (Luthanen & Crocker, 1992). This subscale was used to control the strength of participants identification with their school class, which can affect the evaluations of the participants. Subscale consisted of four items, on which participants answered using seven-point scale (1 = completely disagree; 7 = completely agree). Reliability of the scale amounted α = .79. Items were summed into an index (*M* = 15.51; *SD* = 4.32).

Finally, participants completed a bogus intelligence test. To maximize the relevance of the test, the experimenter emphasized that the test was well validated on a sample of more than 100 000 individuals, and this version was designed especially for high school students, and the results were highly predictive for high school completion, future academic performance, and employment prospects. The test comprised seven tasks similar to Raven's Matrices, and participants had 7 minutes to solve it. After completing the test, participants were informed that within a week at the second part of study they will receive the results.

In a second part of the study, which took place a week later, we introduced the manipulation. In all conditions, an experimenter stressed the validity of the test, and informed the participants that he did not have enough time to prepare an individual feedback. In all conditions, except control condition, participants obtained information that although they can't get their individual results, they can be informed about an average result from high schools, where very recently the same test was administered. In inconsistency conditions, participants obtained information that culinary high school students scored very high on the test. In consistency conditions, group that was presented as the one that scored very high was a group of business school students.

Subsequently, participants again evaluated groups of business school students and culinary school students on the same items as in the first part of the study. Finally, participants from experimental conditions answered on two questions, that assessed

effectiveness of manipulation: to what extent, presented results of (culinary school students/business school students) were: surprising or expected.

Subsequently participants were fully debriefed. The experimenter established that the participants understood that received feedback regarding the test results was bogus and that the test itself did not measure intelligence.

We expected that obtaining information inconsistent with previous knowledge will change the perception of a group to which it refers. In case of this experiment, this should be manifested in a change in perception of culinary school students: they should be perceived as more competent, comparing to first evaluation. Also, if the CE emerged, also evaluations on warmth dimension should change: culinary school students should be perceived as less warm, as compared to the first evaluation. Moreover, it can be predicted that changes in perception of culinary school students, should affect perception of the second group in an opposite direction: business school students should be perceived as less competent and more warm, as compared to the first evaluation. We predicted that there will be no changes when provided information was consistent with the stereotype, and when no information was provided.

Above predictions refer to changes on the means level. As for level of individual evaluations, the CE in case of this experiment, was assessed as: a negative relationship between change in the perception of one group on one dimension, and change in the perception of the same group on the opposite dimension. Moreover, the CE was indicated by the positive relation between change in the perception of one group on one dimension, and change in the perception of other group on the opposite dimension; as well as the negative relation between change in the perception of one group on one dimension, and change in the perception of other group on the same dimension. We also predicted that changes in the perception will be related to NFCC, as stated in hypotheses 3 to 6. We assumed that in control condition (when no information regarding evaluated groups was provided), and

consistency condition, the CE will be stronger among high, as compared to low NFCC participants (hypothesis 3). After experiencing inconsistency, people low in NFCC will show the CE to a greater extent, compared to people high in NFCC (hypothesis 4). Also in inconsistency condition, people with high NFCC will exhibit the CE to a lesser extent, as compared to people with high NFCC from control condition (hypothesis 5), while people with low NFCC will show the CE to a greater extent than people low in NFCC, who did not experience inconsistency (hypothesis 6).

Results

Manipulation check

Firstly, we examined the effectiveness of manipulation. In order to test whether information regarding high position of culinary school students on competence dimension was surprising for participants, as compared to being expected, a multivariate analysis of variance (MANOVA) was conducted with one within-subjects variable: (2) expectation (expected, surprising), and one between-subjects variables: 2 consistency (information consistent with stereotype, information inconsistent with stereotype). Only the interaction term between consistency and expectation reach significance ($F(1,67) = 8.63$, $p < .005$, $\eta^2 = .11$).

Specific comparisons showed, that as predicted, information that given group scored very high on intelligence test, was more surprising ($M = 4.59$, $SD = 1.40$) than expected ($M = 3.26$, $SD = 1.42$), when it refers to culinary school students ($t(33) = 2.98$, $p = .003$, $d = .94$); while it refers to business school students, it was more expected ($M = 4.11$, $SD = 1.65$) than surprising ($M = 3.49$, $SD = 1.73$), although the difference was not statistically significant ($t(36) = 1.25$, $p = .099$, $d = .37$). This indicates, that the manipulation was effective, because in inconsistency condition participants perceived provided information as inconsistent with previous knowledge, while in consistency condition as consistent.

Testing the hypotheses regarding changing perception of the group

In order to test, whether the perception of groups changed, a multivariate analysis of covariance (MANCOVA) was conducted with three within-subjects variables: (2) group (culinary school students, business school students), (2) dimension (warmth, competence), (2) evaluation moment (before manipulation, after manipulation); and one between-subjects variable: 3 consistency (information consistent with stereotype, information inconsistent with stereotype, no information); and 5 covariates: Importance to Identity, first and second evaluation on morality dimension of culinary school students, and first and second evaluation on morality dimension of business school students.

Highest order statistically significant effect was four-way interaction, between all within-subjects variables, and consistency ($F(2,93) = 3.79$, $p = .026$, $\eta^2 = .08$). The means of the evaluations and its standard errors are shown in Figure 8 and 9.

Figure 8. Means and standard errors of evaluations of culinary school students, on dimensions of warmth and competence, before and after manipulation, in three conditions: consistency, inconsistency, and control.

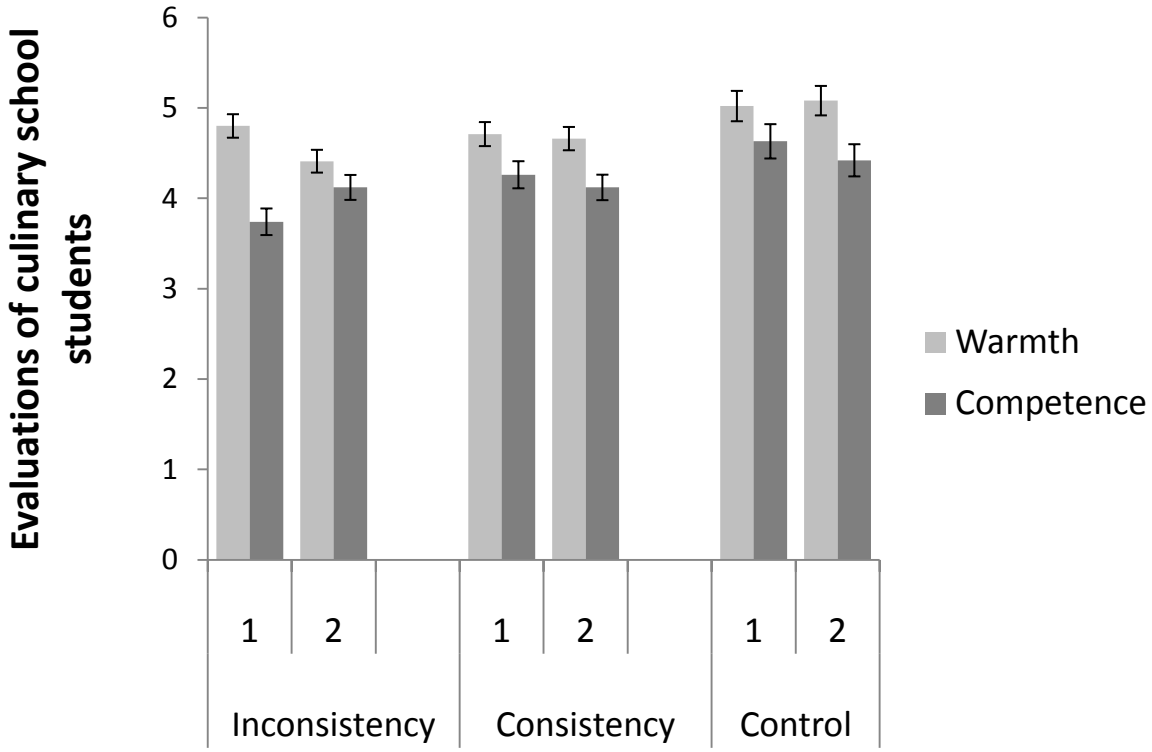
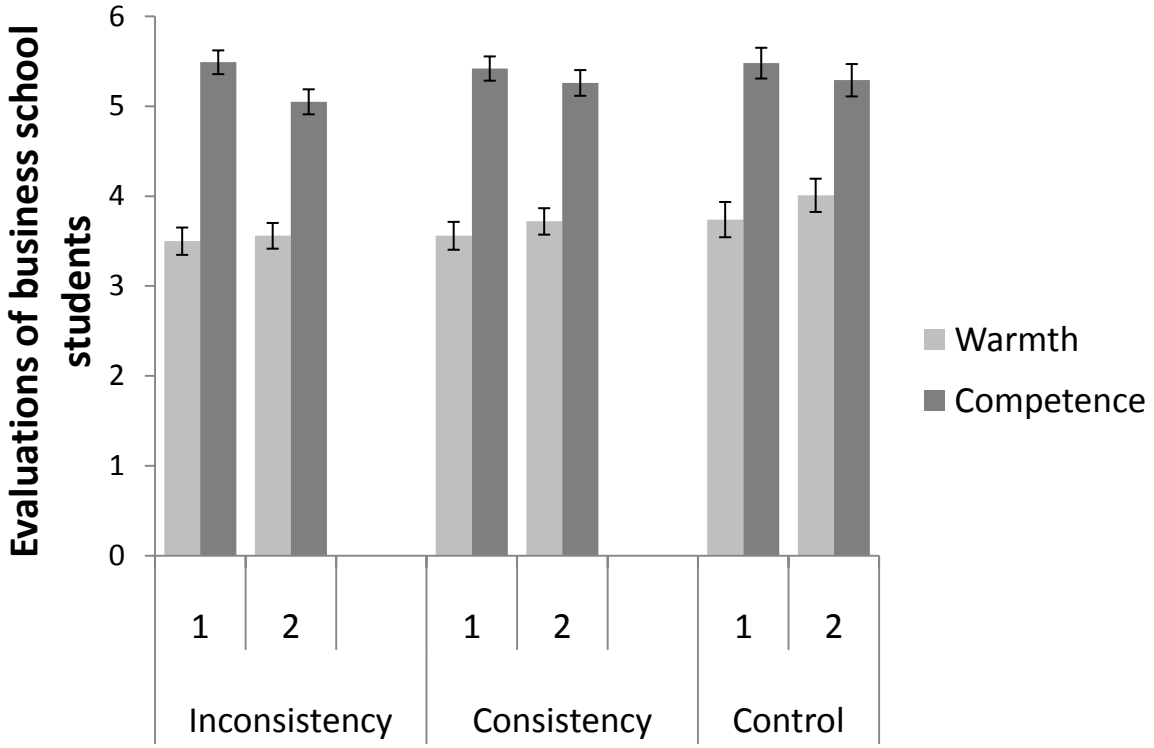


Figure 9. Means and standard errors of evaluations of business school students, on dimensions of warmth and competence, before and after manipulation, in three conditions: consistency, inconsistency, and control.



In order to understand the nature of the four-way interaction, specific comparisons with Bonferroni's correction were conducted. Comparisons showed, that as expected, in all conditions culinary school students were perceived as more warm than competent, and business school students as more competent than warm. Also in all conditions, culinary school students were evaluated as more warm than business school students, while business school students were perceived as more competent than culinary school students. This can be seen also based on means and its standard errors presented in figure 8 and 9. This confirms, that culinary school students was a group perceived as warm and incompetent, while business school students as competent and cold group.

In the next step, perception of groups on both dimensions, between conditions was examined. It was assumed, that there will be no significant differences in the perception of groups between conditions before experimental manipulation, i.e., while they were evaluated for a first time. However, results showed that in inconsistency condition during first

evaluation, culinary school students were perceived lower on dimension of competence, as compared to consistency condition ($t(79) = 4.31$, $p = .072$, $d = .973$), as well as in comparison to control condition ($t(61) = 4.31$, $p = .001$, $d = 1.276$). No other differences were statistically significant. Observed differences in the first evaluation raise problems, because this indicates, that the baseline perception of evaluated groups was different between conditions. Thus, it is hard in a legitimate way to interpret changes in the perception of this group on this dimension, as a result of manipulation. Instead, higher evaluations of culinary school students on dimension of competence in inconsistency condition – that was predicted as an effect of manipulation – can indicate on a regression toward the mean.

Comparison of evaluations of groups between first and second measurement revealed that in the inconsistency condition (culinary school students presented as high on competence dimension), in the second measurement as compared to the first: culinary school students were evaluated as more competent ($t(40) = 2.27$, $p = .022$, $d = .344$), less warm ($t(40) = 2.18$, $p = .012$, $d = .400$), and business school students were evaluated as less competent ($t(40) = 2.97$, $p = .003$, $d = .366$) but not more warm. As predicted, no changes in the consistency and control conditions were statistically significant.

In sum, three out of four predicted effects, which indicate the CE, were observed on the level of differences in means. When culinary school students were presented as high on competence, which was inconsistent with previous knowledge of participants, perception of evaluated group changed: culinary school students were perceived as more competent and less warm than before, and business school students were perceived as less competent, but not as more warm.

Need for cognitive closure and the CE

As an interpretation of change in the perception of culinary school students on dimension of competence is problematic, because of the above mentioned reasons, thus in later analyses as a predictor we used change score (difference between second and first evaluation) on the warmth dimension, of students from culinary school. Two conditions from consistency variable were used: inconsistency condition (in which changes on a level of means were observed), and control condition. Moreover, an additional predictors, used in order to control its influence, were: change score in evaluation of culinary school students on morality, change score in evaluation of business school students on morality, importance to identity subscale, and two out of three remaining change scores (change score in evaluation of culinary school students on competence, change score in evaluation of business school students on competence, and change score in evaluation of business school students on warmth). Positive values of indexes indicate that a given group on a given dimension was perceived higher in the second evaluation, as compared to the first one. Before computing interaction terms, variable identifying experimental condition was dummy coded, and all continuous variables were standardized.

It was expected that after experiencing inconsistency, people low in NFCC will show the CE to a greater extent, compared to people high in NFCC (hypothesis 4). Also in inconsistency condition, people with high NFCC will exhibit the CE to a lesser extent, as compared to people with high NFCC from control condition (hypothesis 5), while people with low NFCC will show the CE to a greater extent than people low in NFCC, who did not experience inconsistency (hypothesis 6). Thus, a three-way interaction between change score on warmth evaluation of culinary school students, experimental condition and NFCC was expected to be significant.

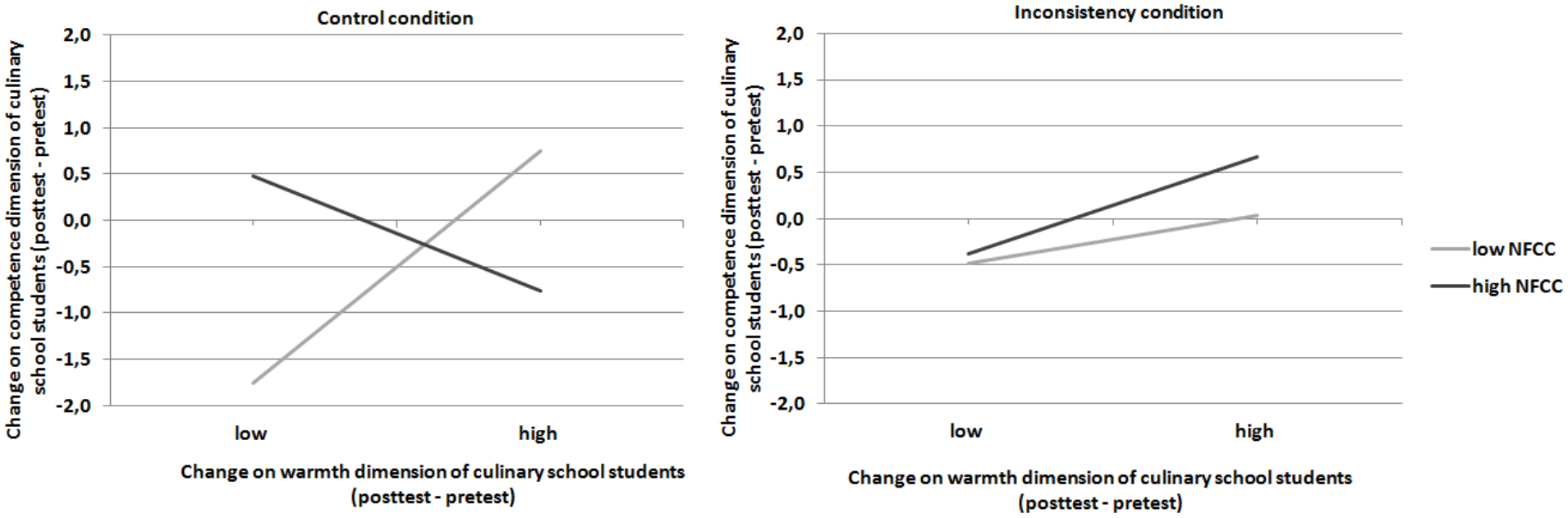
We examined the relationship between change in the perception of culinary school students on warmth (predictor), and change in the perception of culinary school students on

competence (dependent variable)[7]. So, negative relationship between these change scores indicates the CE (the more culinary school students were perceived as warmer after, than before manipulation, the more they should be perceived as less competent after, than before manipulation).

Model was significant ($F(13,49) = 3.20$, $p = .002$, $R^2 = .46$). Comparison condition ($\beta = .67$; $t = 2.24$, $p = .030$), and two-way interaction between change score on dimension of warmth for culinary school students and NFCC were statistically significant ($\beta = -.937$; $t = 2.17$, $p = .035$). As predicted, also thee-way interaction between NFCC, condition and change score on warmth for culinary school students was statistically significant ($\beta = 1.07$; $t = 2.22$, $p = .031$). The interaction is depicted on Figure 10.

[7] We also tested other models: the same model with change in the perception of culinary school students on warmth dimension (predictor), and change in the perception of business school students on competence dimension (dependent variable) turned out to be significant, and similar effects occurred; for model with change in the perception of culinary school students on warmth dimension (predictor), and change in the perception of business school students on warmth dimension (dependent variable) we did not obtain pattern of results indicating on the occurrence of the CE.

Figure 10. Regression lines show change in the perception of culinary school students on competence dimension (evaluation in pretest subtracted from evaluation in posttest), as a function of change in the perception of culinary school students on warmth dimension (evaluation in pretest subtracted from evaluation in posttest), NFCC, and experimental condition.



Simple slope analysis indicated, that in control condition, negative but insignificant relation between predictor and dependent variable appeared among high NFCC participants (β = -.62; t = 1.41, p = .166), but positive and significant among low NFCC participants (β = 1.256; t = 2.29, p = .026). In experimental condition, this pattern reversed for high NFCC participants (β = .52; t = 1.30, p = .201), but for low NFCC participants remained positive (β = .26; t = 1.59, p = .119).

In order to test hypotheses similar as in previous experiments, comparisons of difference between slopes coefficients were performed (Cohen, Cohen, West, & Aiken, 2003). As predicted (hypothesis 5), the CE was stronger among people high in NFCC while they did not experience inconsistency, as compared to the situation when they experienced inconsistency (Z = 1.91; p = 0.030). Hypothesis 4 was not confirmed, as after experiencing inconsistency, there was no significant difference between people high and low in NFCC (Z = .60; p = 0.550). Also hypothesis 6 was not confirmed, since pattern of results does not indicate that people low in NFCC after experiencing inconsistency were showing the CE.

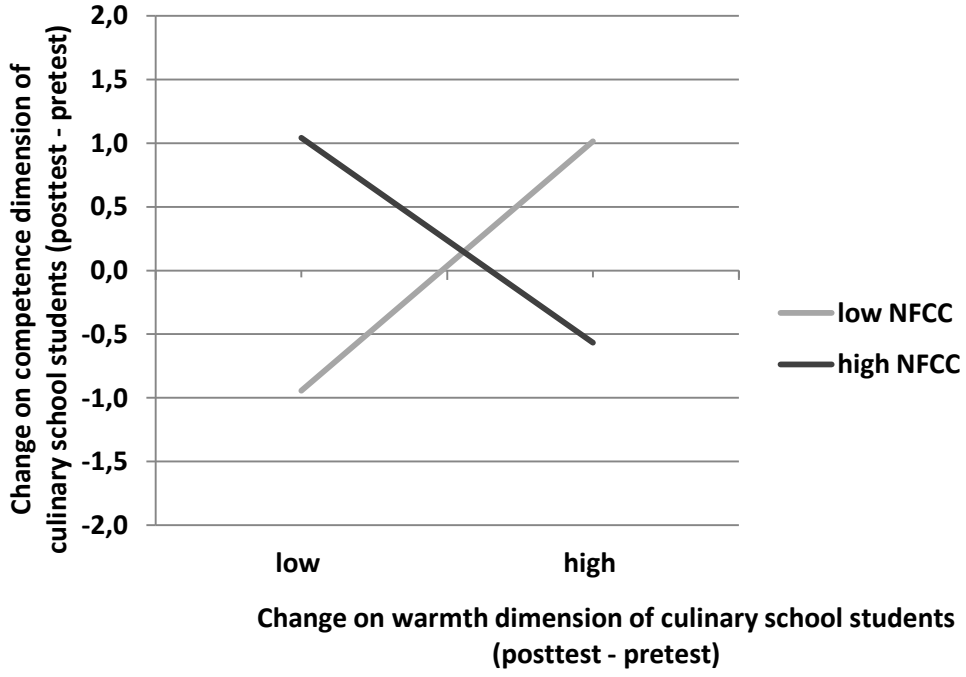
In order to test hypothesis 3, that in control condition (when none information regarding evaluated groups was provided), and consistency condition, the CE will be stronger among high as compared to low NFCC participants, the analysis as described above was performed. The only difference was that instead comparing inconsistency and control condition, consistency and control conditions were compared. In this case, it was expected that only interaction between change in perception on warmth dimension of culinary school students, and NFCC will be statistically significant.

As before, the relationship between change in the perception of culinary school students on warmth dimension (predictor), and change in the perception of culinary school

students on competence dimension (dependent variable) was examined. As before, negative relationship between these change scores indicates the CE[8].

Model was significant ($F(13,48) = 2.27$, $p = .020$, $R^2 = .38$). Two effects were significant: change score on competence for business school students ($\beta = .335$; $t = 2.57$, $p = .013$), and a two-way interaction between NFCC and change score on warmth for culinary school students ($\beta = -.891$; $t = 2.76$, $p = .008$). The interaction is presented on Figure 11.

Figure 11. Regression lines show change in the perception of culinary school students on competence dimension (evaluation in pretest subtracted from evaluation in posttest), as a function of change in the perception of culinary school students on warmth dimension (evaluation in pretest subtracted from evaluation in posttest), and NFCC, in consistency and control conditions.



Simple slope analysis showed that irrespectively of condition, negative relation between predictor and dependent variable appeared among high NFCC participants (β = -

[8] Also as before, we tested other models: model with change in the perception of culinary school students on warmth dimension (predictor), and change in the perception of business school students on competence dimension (dependent variable) was significant, and similar effects occurred; but for model with change in the perception of culinary school students on warmth dimension (predictor), and change in the perception of business school students on warmth dimension (dependent variable) model did not reach significance.

.80; t = 2.19, p = .016), while among low NFCC participants this relation was positive (β = .978; t = 2.99, p = .002).

In order to test hypotheses, comparisons of differences between slopes coefficients were performed (Cohen, Cohen, West, & Aiken, 2003). As predicted, the CE was stronger among people high in NFCC, as compared to people low in NFCC, when no inconsistency was present (Z = 3.63; p < .001).

Before discussing results of the experiment, one more analysis will be described that was not planned beforehand. Because none of performed analyses supported predictions regarding the occurrence of the CE among people with low NFCC after experiencing inconsistency, it was tested whether the impact of manipulation on people low in NFCC was not weaker, as compared to people high in NFCC. Thus, we performed the regression analysis, with NFCC, consistency condition, interaction term between them, and comparison condition as predictors, and value of averaged manipulation check questions as a dependent variable. The higher the value of index, the more surprising and unexpected was provided information.

Model was significant (F(4,67) = 4.56, p = .003, R^2 = .21). All predictors were statistically significant: consistency condition (β = -4.75; t = 2.37, p = .021), comparison condition (β = .67; t = 2.0, p = .049), NFCC (β = -.78; t = 2.25, p = .028), and interaction term between NFCC and consistency condition (β = 1.45; t = 2.86, p = .006).

Simple slope analysis showed that in consistency condition, NFCC was related negatively with dependent variable (β = -.78; t = 2.25, p = .028), and in inconsistency condition positively (β = .67; t = 1.85, p = .069). Thus, the higher the NFCC, the more expected was information consistent with previous knowledge; while when information was inconsistent, the higher the NFCC, the more this information was perceived as unexpected.

Therefore, it seems that the impact of manipulation on people low in NFCC was weaker, as compared to people high in NFCC.

Discussion

The experiment provided preliminary support for an observation made in previous studies on the CE, that change in perception of a given group on one dimension can affect change in the opposite direction on the second dimension (Kervyn, Yzerbyt, & Judd, 2010). The results reveled that information that a group low on competence scored high on intelligence test, resulted in lower evaluation of this group on warmth dimension, as compared to evaluation made before such information was provided. Moreover, an evaluation of the second group on the competence dimension dropped, even though no information regarding this group was provided. This pattern is consistent with the CE, and as we believe, can serve as an interesting starting point for further research, especially since, as far as we know, the CE has not been tested yet in the context of stereotype change.

The results obtained in the experiment provided mixed support for hypotheses tested in this thesis. Hypothesis 3, predicting that the CE will be stronger among people high in NFCC, as compared to low in NFCC in conditions where no inconsistency is present, was supported in two out of three analyses. No effect was found for the relation between change on warmth dimension for one group, and change on the same dimension for a second group. The same applies to hypothesis 5, that the CE is stronger among high NFCC individuals who do not experience inconsistency, as compared to high NFCC individuals who experience it. This hypothesis also found support in two out of three analyses, and, the same as hypothesis 3, was not supported when a dependent variable was change score on warmth dimension of business school students. Hypotheses 4 and 6, which refer to low NFCC participants, and predict that after experiencing inconsistency, they will exhibit the CE, did not find support in any of the analyses.

A lack of effects for low NFCC participants can possibly be explained by the fact that the manipulation itself had weaker influence on people low in NFCC. Obtaining information inconsistent with previous knowledge, from the very definition of NFCC, should be less surprising for participants who do not have high need to maintain stable structure of knowledge, i.e., people low in NFCC. Perhaps manipulation was not sufficient to induce the predicted change in information processing strategy.

3. General discussion

The compensation effect is a phenomenon that occurs when social targets are evaluated on two fundamental dimensions of social perception: warmth and competence. When such a situation arises – especially when two social targets are compared – the two dimensions appear to be intertwined to compensate one another. When one social object is perceived as being better than the second object on one dimension, the second object is perceived as being better than the first on the other dimension. This hydraulic relationship is explained in the literature using SJT and motivation to view the social world as a just place. The CE is assumed to be used in order to align the perceived differences between groups, which justifies the social system (every group has its own strength and weaknesses) and maintains the social structure. However, this explanation was, to our knowledge never proven in an empirical study and is difficult to apply in many research contexts in which the CE had already been demonstrated. In this thesis, we proposed an alternative explanation of the CE and tested it in a series of five experiments.

The purpose of the CE proposed in this thesis is to obtain quick and easy solution to the task of comparing two social objects on two dimensions. Reaching the solution is possible by applying previously learned knowledge regarding the relationship between the two fundamental dimensions. It was assumed that the negative relationship between the warmth and competence dimensions is learned from environments (e.g., from contact with complementary stereotypes). The knowledge that two fundamental dimensions are negatively related becomes one of the possible influences in the task of evaluating and comparing social objects. The influence of such knowledge on the occurrence of the CE was tested in experiment 1. In this experiment, we showed that such a tendency in fact exists: the more people believed in complementary inferential rules (positive characteristics on one dimension imply negative characteristics on the second dimension), the stronger the CE. In

addition, the influence of complementary rules on the CE was especially strong among people with high NFCC, who are more prone to relying on previously learned knowledge.

Another assumption of the model that was tested in this thesis was that if the CE is an application of previously learned knowledge that is used to obtain simple solutions to tasks, it should be an especially attractive tool for people who are motivated to obtain these simple solutions, namely, people with high NFCC. Hypothesis 3 that the CE would be used mainly by people with high NFCC (when nothing in their environment kept them from using their preferred information processing styles) found support in every experiment in which it was tested. This fact gives strong support for the interpretation of the CE that is proposed in this thesis. It is difficult to claim that people with high NFCC are more motivated than people with low NFCC to maintain their belief in a just and fair world in which all groups have their own strengths and weaknesses and therefore these people demonstrate the CE. In fact, it has been demonstrated that NFCC is positively related to quite opposite perspectives on the social world: authoritarianism (Chirumbolo, 2002; Kossowska, & Van Hiel, 2003; Webster & Kruglanski, 1996); religious and nationalist right-wing beliefs (Golec de Zavala, Cisłak, & Wesolowska, 2010); and social dominance orientation and racism (Roets & Van Hiel, 2006; Van Hiel, Pandelaere, & Duriez, 2004). Kelemen and colleagues found no direct correlation between NFCC and belief in a just world or system justification (Kelemen, Szabo, Mészáros, László, & Forgas, 2014; also Jaśko, 2011). Therefore, the alternative explanation of the CE that accords with the lay epistemics theory proposed in this thesis appears to be more plausible.

The final model assumption that was tested in this thesis was that with additional environmental cues that could keep participants from using their preferred information processing styles, the relationship between NFCC and the CE would reverse, i.e., the CE would have been used more by people with low NFCC. In our experiments, the cue was the experience of inconsistency between the stereotypical knowledge and the obtained

information. Hypotheses related to this assumption (Hypotheses 4, 5, and 6) found mixed support, and a number of explanations are possible.

First, as was the case in experiment 5, it is possible that the manipulation itself more strongly influenced people with high NFCC than those with low NFCC; the experience of inconsistency, based on the mere definition of NFCC, could be especially aversive for people with high NFCC but not necessarily for others. This phenomenon could explain why people with high NFCC who experienced inconsistency, as we predicted, showed the CE to a lesser extent than did the people with high NFCC who did not experience inconsistency but it did not lead people with low NFCC to show the CE to a greater extent.

A second explanation is that the postulated mechanism was too far-reaching. The factors that induce changes in a preferred style of information processing: control deprivation (Otten & Bar-Tal, 2002; Kossowska, Dragon, & Bukowski, 2014), self-image threat (Kossowska, Bukowski, Guinote, *under review*), or powerlessness (Kossowska, Guinote, Strojny, *under review*) have in common that they are not default states of individuals' functioning and they are subjectively unpleasant. This is also the case with cognitive inconsistency (Festinger, 1957; Gawronski, 2012). We assumed that these unpleasant states would increase people's motivation to resolve them using very specific means, namely, altering their regular information processing methods. It was assumed that such "stop signals" (Kossowska, Bukowski, Guinote, *under review*) from the environment would lead people to conclude that their regular information processing methods were not efficient, and that they would adapt to these situations by changing their information processing strategy. In other words, people who prefer effortless heuristic processing (high NFCC) would adapt by engaging more resources, whereas people who normally use effortful processing (low NFCC) would use heuristic strategies. It is possible that experiencing a new unpleasant state does not automatically lead to reversing how information is processed but

simply disorganizes default information processing strategies (Kossowska, 2014). Currently, it is difficult to resolve this issue, and additional research is needed.

Combining our obtained results, we believe that it can be stated that the CE is related to individuals' motivation to achieve closure (based on the fact that hypothesis 3 was confirmed in all studies in which it was tested, on different groups of participants and using different intergroup contexts). Moreover, the results of experiment 1 provided evidence that for people to demonstrate the CE, they must have previous knowledge regarding the negative relationship between the dimensions on which they compare the social targets. Thus, we emphasize again that we do not deny a potential relationship between system justification motivation and the existence of complementary or ambivalent stereotypes. Moreover, we believe that the existence of complementary stereotypes in cultures (whatever their purpose) is a necessary condition for the CE to occur. What we aimed to show in this thesis was that no special motivation to justify the system is needed for the CE to occur and that the underlying mechanism is much simpler: the CE is the application of a previously learned relationship between two dimensions that is used to resolve a task in which two social objects are compared on these dimensions. In other words, the effect of the CE could be to maintain the status quo in a society, but, as we believe was demonstrated in this thesis, that does not mean that this is the purpose or motivation responsible for occurrence of the CE.

Study limitations and directions for future research

One of the limitations of our study is that all of the studies were conducted in an intergroup context using direct measures. Given that the CE has also been demonstrated on an interpersonal level and using indirect and implicit measures, the obtained results should in the future be replicated in different contexts and using different methods in order to exclude the possibility that the obtained effects are specific only for intergroup contexts. Additionally, more research is necessary to establish what exactly occurs when people experience a "stop

signal" in their environments: does it directly affect their epistemic motivation; does it affect a task's perceived characteristics (is it perceived as being more demanding); does it signal that one's default strategy is ineffective; does it provoke a person to change his or her strategy (as was assumed in this thesis); or does it simply disorganize the person's regular way of information processing without leading to changing the strategy? In other research that measures NFCC and includes additional manipulation, we believe that it will be important to test not only whether the manipulation was successful (there were differences between the experimental and control conditions) but also whether the manipulation equally influenced people with high and low NFCC. Because this is what we found in experiment 5, this condition was not met.

We believe that future research should also examine the possibility that the CE can be found in the context of stereotype changes because it has important practical consequences. To our knowledge, experiment 5 was the first study in which this possibility was empirically tested, and although the results were not fully conclusive, we believe that this line of research should be further examined. Another interesting line worth further examination is the possibility that the CE is not specific, as is assumed in the literature, to the dimensions of warmth and competence. Although these dimensions have the status of fundamental dimensions of social perception, it is possible that they are not unique regarding their role in the occurrence of the CE. It appears that it is possible for compensatory perception to occur if the dimensions are perceived as being stereotypically negatively related. The fact that a compensatory relationship does not exist for a particular pair of dimensions (warmth/competence, and healthiness or political interest) does not imply that such a relationship does not exist for any pair of dimensions except warmth and competence. Some preliminary support for this possibility can be found in a study that was conducted by Maris and Hoorens (2012). In this study, participants learned about relationships between two novel groups on two dimensions. The relationships were complementary: one group was high on the first dimension and low (or average) on the

second, and the second group was low on the first and high (or average) on the second. Subsequently, the participants obtained information that was congruent or incongruent with the previously learned stereotype of the group. The results showed that receiving incongruent information changed not only the stereotype regarding the group to which the information referred but also the stereotype about the second group, and the changes followed a complementary direction. What is important is that the content of both of these dimensions was related to competence. We believe that although the dimensions of warmth and competence are fundamental for social perception, there is nothing unique in their content itself that is responsible for the occurrence of the CE. We believe that the mechanism of the CE is related to the negative relationship between these dimensions, which is learned from environments. Thus, the CE can potentially be applied to any dimensions that have been learned as often negatively related, as in the study conducted by Maris and Hoorens (2012).

If in fact, as was assumed in this thesis, the CE is an application of previously learned knowledge to resolve the task of comparing two social objects, it should not be limited purely to warmth and competence but should occur for all pairs of dimensions that are stereotypically perceived as being negatively related. This phenomenon should also hold even if the dimensions are trivial, but a negative relationship between them was previously learned. This possibility should thus be tested in additional research because, as we attempted to show in this thesis, the CE is not used to justify social system using fundamental dimensions of social perception but is an application of previously learned knowledge that is used to solve a task of evaluating and comparing social objects.

Irrespective of whether or not the CE can also be found for other dimensions of social perception, this effect occurs for fundamental dimensions that people use to perceive social objects and make sense of their social worlds and that are spontaneously encoded from people's faces (Imhoff, Woelki, Hanke, & Dotsch, 2013). Therefore, it is of great importance

to understand the mechanism responsible for the fact that in a variety of situations and in both intergroup and interpersonal contexts, these two dimensions are negatively related. We know how and when negative relationship between fundamental dimensions of perception affects people's judgments, but we do not know why, and this issue has remained unresolved for a decade. In this thesis, we attempted to identify such a mechanism in the realm of social cognition. We hope that the reasoning presented here will bring us closer to solving this riddle.

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