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## To be right or to be liked?

*Correlates of preschoolers' informational and  
normative conformity*

KAHL HELLMER



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### **Abstract**

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Humans conform. That is, humans align their behaviors, attitudes, and beliefs with others to learn and adapt. When we are uncertain, naïve, or believe that others know better than us – we can conform for informational reasons and imitate behaviors or ideas observed from the majority of those around us. If the masses are doing something we can suppose that it likely is effective or right. Likewise, when we need to strengthen bonds with others, fear being ostracized, or simply wish to befriend other individuals, we can normatively conform and strategically imitate their behaviors or ideas to signal affiliation outwardly, while still privately retaining our original beliefs. Importantly, although conformity is intrinsic to all human cultures and age-groups, there is also notable inter-individual variability in conformity propensity: Some individuals tend to conform often while others conform very rarely. This applies to both adults and young children. In this thesis I have addressed the variability in children's conformity by investigating both propensity and motivation using an individual differences perspective. The overarching aim was to identify psychological (personality traits) and psychosocial factors (parents' personality and parental style), as well as other social behaviors (obedience and altruistic behavior) that can help to explain why some children conform more than others, and importantly, why they differ in their motivation to conform.

Using an Asch-style paradigm to elicit public conformity in 3.5-year-olds using adult (Study I) and peer (Studies II and III) confederates, we established individuals' conformity propensity over eight trials. Additionally, using an eye-tracking task during each trial, we measured what the participant privately held as true after publicly conforming. This measure allowed us to differentiate whether the conformity was informational (believing that the majority's inaccurate testimony was correct) or normative (knowing that it was not, but conforming for social reasons).

The main findings reported in this thesis are (i) the personality trait extroversion has a U-shaped relationship with conformity propensity – low and high scores on this trait are predictive of more conformity to both adults (Study I) and peers (Study III); (ii) when children conform, high extroversion is predictive of doing so for a normative motivation and low extroversion for an informational (Studies I and III); (iii) children with higher conformity propensities are more likely to have displayed altruistic behavior but not obedience (Study II); and (iv) fathers' authoritarian parental style is associated with their children's conformity propensity (Study II).

*Keywords:* Conformity, Informational conformity, Normative conformity, Developmental conformity, Altruism, Altruistic behavior, Obedience, Authoritarian parental style, Extroversion

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*To knowing when (not) to  
trust majority consensus*



# List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Hellmer, K., Stenberg, G., & Fawcett, C. (2018). Preschoolers' conformity (and its motivation) is linked to own and parents' personalities. *British Journal of Developmental Psychology*, 36(4), 573-588.
- II Hellmer, K., Stenberg, G., & Fawcett, C. (*submitted for publication*). How does preschoolers' conformity relate to parental style, anonymous sharing, and obedience?
- III Hellmer, K., Stenberg, G., & Fawcett, C. (*submitted for publication*). Preschoolers' extroversion influences their propensity and motivation to conform to peer testimony.

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For all studies included in this thesis, Kahl Hellmer planned and designed the experiments, analyzed the data, and wrote the manuscripts, along with contributions to all aforementioned areas from supervisor and co-author. Kahl Hellmer conducted data collection for Study I and assisted Rosanna Apelgren and Johan Nilsson who conducted the main part of data collection for Study II and III (shared dataset).



## Additional scientific work not included in the thesis

- Jylhä, K. M., & **Hellmer, K.** (2020). Right-Wing Populism and Climate Change Denial: The Roles of Exclusionary and Anti-Egalitarian Preferences, Conservative Ideology, and Antiestablishment Attitudes. *Analyses of Social Issues and Public Policy*.
- Hellmer, K.**, Söderlund, H., & Gredebäck, G. (2018). The eye of the retriever: Developing episodic memory mechanisms in preverbal infants assessed through pupil dilation. *Developmental science*, 21(2).
- Hellmer, K.**, Stenson, J. T., & Jylhä, K. M. (2018). What's (not) underpinning ambivalent sexism?: Revisiting the roles of ideology, religiosity, personality, demographics, and men's facial hair in explaining hostile and benevolent sexism. *Personality and Individual Differences*, 122.
- Hoehl, S., **Hellmer, K.**, Johansson, M., & Gredebäck, G. (2017). Itsy bitsy spider...: Infants react with increased arousal to spiders and snakes. *Frontiers in psychology*, 8.
- Hellmer, K.**, & Nyström, P. (2017). Infant acetylcholine, dopamine, and melatonin dysregulation: Neonatal biomarkers and causal factors for ASD and ADHD phenotypes. *Medical Hypotheses*, 100.
- Kenward, B., **Hellmer, K.**, Winter, L. S., & Eriksson, M. (2015). Four-year-olds' strategic allocation of resources: Attempts to elicit reciprocation correlate negatively with spontaneous helping. *Cognition*, 136.
- Hellmer, K.**, & Madison, G. (2015). Quantifying microtiming patterning and variability in drum kit recordings: A method and some data. *Music Perception: An Interdisciplinary Journal*, 33(2).



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# Abbreviations

AI	Anterior Insula
AOI	Area of Interest
EEG	Electroencephalography
ERP	Event-Related Potential
FFM	Five-Factor Model (of personality)
HEXACO	HEXACO model of personality structure
ICID-S	Inventory of Children's Individual Differences, Short version
IQ	Intelligence Quotient
PSDQ	Parenting Styles and Dimensions Questionnaire
RWA	Right-Wing Authoritarianism
VS	Ventral Striatum



# Introduction

“If you ever get close to a human  
And human behavior  
Be ready, be ready to get confused  
There's definitely, definitely, definitely no logic  
To human behavior  
But yet so, yet so irresistible”

Guðmundsdóttir, B. (1993). Human Behavior.  
*On Debut*. Elektra Entertainment.

Humans, being inherently social creatures, are to a large extent influenced by other humans' behaviors, ideas, attitudes, and beliefs. We adjust to, are biased by – and sometimes plainly imitate – behaviors and notions that are represented around us in our social world. Observation and imitation of others help us learn and develop as individuals and, importantly, strengthen bonds within social groups. Early in life, we learn about our world from others who are more experienced. Part of this learning consists of explicit directions, instructions, and information given by others – but we also learn *socially* by observing and interacting with others. When others move and behave, react to events, and interact with others – they are effectively modelling behaviors from which we can learn, adapt, and develop. For example, we can copy others' behavior when we are uncertain (a good starting point when one is naïve), if a group of others behaves in a specific manner (if many are doing the same thing it is likely effective), or if someone else's behavior seems better than what we are currently doing (Laland, 2004). There is a large consensus that such selective imitation strategies are, as a whole, adaptive for both the individual who imitates and for the groups to which they belong (Henrich & Boyd, 1998). That is, the copying of others' beliefs or behaviors is not limited to advantages of gaining knowledge or improving behavioral efficiency, imitation can also be used to signal affiliation with others, showing that we belong. We thus imitate to increase cohesion in a group by acquiescing the group's norms. These alignments of behavior, beliefs, or attitudes with a majority norm is referred to as *conformity*.

In a wider sense of the term conformity, groups of humans tend to conform to norms around them and thus maintain variability in specific social variants between families, parochial groups, and cultures (cultural transmission;

Cavalli-Sforza, Feldman, Chen, & Dornbusch, 1982). Such maintenance of group-specific norms is transferred by both reinforcement- and implicit learning of norms (Ivanchei, Moroshkina, Tikhonov, & Ovchinnikova, 2019). Any group of humans, although with considerable within-group individual variability, is generally biased towards conformity to the group's norms. We internalize norms regarding behavior and beliefs that are displayed in our culture or group by identifying and complying with them. Such compliance and acquiescence of group norms may elicit negative associations, but this is not necessarily the case. For example, when people are informed that others – such as neighbors or friends – are doing something seen as favorable or beneficial, they increase their own efforts, whether it pertains to refraining from tax evasion (Coleman, 2007) or increasing donations to charity (Smith, Windmeijer, & Wright, 2015).

In a narrower sense of the term conformity, if an individual faces in-group members or some majority of others whose opinion or behavior is irreconcilable with the individual's, social or epistemic dissonance will emerge. It is stressing to be the sole advocate of an idea or some behavior when a unanimous majority of group members concludes otherwise (Devine, Tauer, Barron, Elliot, Vance, & Harmon-Jones, 2019). In such situations, the individual may (1) infer that there is a level of social pressure to align their opinion or behavior with the others' or (2) may hesitate or to some degree mistrust their initial behavior or opinion. Either of these two forces can cause us to change our behavior or opinion in favor of the group's, resulting in normative or informational conformity (e.g., Deutsch & Gerard, 1955). As humans, we are more or less susceptible to such effects. Some people are more prone to aligning with the majority in favor of social cohesion, some are more prone to mistrust their own initial judgement in favor of the others', and some are more prone to stick with their own assessment – whatever any potential social or epistemic costs (e.g., Efferson, Lalive, Richerson, McElreath, & Lubell, 2008).

The aim of this thesis is to expand empirical and theoretical knowledge of conformity by introducing individual differences perspectives. Because all humans conform to different extents, comparing characteristics of those who conform more to the characteristics of those who conform less, opens an avenue into the nature of conformity. By showing that certain traits, environmental backgrounds, or other social behaviors are linked with increased propensities for conforming, inferences about motivations and cognitive mechanisms can be made. In this thesis, I focus on 3.5-year-old preschool children to give an account of relatively early behavioral conformity. The general rationale for recruiting young preschoolers is that already at this age children are susceptible to majority information (e.g., Corriveau & Harris, 2010; Haun & Tomasello, 2011; Ma & Ganea, 2009; Morgan, Laland, & Harris, 2015) and are able to participate in experimental paradigms similar to those employed with adults – letting us tap conformity as ontogenetically early as reliably possible.

Although young children conform to about the same extent as adults, and can even strategically make use of conformity as means of affiliation (Cordonier, Nettles, & Rochat, 2017), young children are less able to form complex top-down reasoning about their behavior, thereby allowing us to tap a purer form of conformity than what might be seen in older children or adults. The specific rationale for recruiting 3.5-year-olds is that this age is arguably the most optimal: By the age of four, children are more autonomous and display less conformity to majority consensus while three-year-olds are more socially malleable (e.g., Schillaci & Kelemen, 2014). First, I give a historical background of conformity as a research field, followed by more recent empirical and theoretical studies on this behavior as background for the three empirical studies I will present.

## Brief historical overview of studies on conformity

The first published study on conformity, to the best of my knowledge, was the article *The comparative influence of majority and expert opinion*, by Henry T. Moore (1921). Although Moore (p. 16) notes that James Winfred Bridges (1914) had previously identified a phenomenon called “susceptibility” which was defined as a construct overlapping with conformity, Moore’s study was the first to specifically to introduce others’ opinions and measure the effects they had on participants’ initial judgements. Judgements on three topics were noted in a first visit and upon revisiting the experiment two months later, participants were informed of others’ opinions before asking them for another judgement. Moore (1921) only used anonymous testimony of an absent majority, as the participants did not get to meet them in person. The effects of the testimony were nonetheless clear, and participants’ answering was biased in favor of majority testimony. However, the design of the study left many extraneous variables uncontrolled for (e.g. long-term memory effects in recalling past judgements; aesthetic judgements of music preference as used in this study cannot be assumed to be particularly stable). Twenty years later, more robust empirical accounts of the characterization and measurement of conformity were made by Muzafer Sherif (1935). Sherif (1937) used a laboratory setting in his studies and focused more on the formation and change of attitudes. In a series of experiments, he used the illusory movement of a light point in an otherwise completely dark room, known as the autokinetic effect. When asked to describe the extent of (illusory) movement that was perceived, each individual participant described a range that was particular to each individual. Sherif observed how participants moved towards an experimentally elicited norm when they were asked to give continuous judgements as a group. That is, participants’ initial descriptions of the phenomenon changed in order to align better with others’ descriptions. Other than Sherif’s work (1935; 1937), scholars investigating conformity at this time were more inclined to

investigate statistical and methodological issues with conformity as ecological and natural phenomena – and data were collected, for example, by analyzing behavior in traffic or assessing how annoyed one is by over-hearing conversations in libraries (e.g., Allport, 1934; Katzoff, 1942; Zubin, 1943).

Studies of conformity and social pressure were bolstered by Solomon E. Asch's (1951) studies of conformity. In a series of laboratory experiments, Asch provided not only engaging and thought-provoking results – but also an experimental paradigm that allows for reliable individual measurements of conformity, and which is still used today. In Asch's setting, participants were welcomed to the experiment under the pretense that they were participating together with several others in an experiment regarding visual discrimination, yet the other participants were actually volunteer confederates who played roles in the experiment. The task was ostensibly to identify which of three different length comparison lines were a match to a reference line. The lengths of the comparison lines were easily discriminable and the task was designed to be easy. The participant and the confederates were always lined up so that the participant gave their answer among the last, thus always hearing a majority of the confederates' answers before stating their own. On several occasions, the answers of the unanimous majority contradicted the participant's perceptual information – creating a way of measuring whether individual participants conformed to the confederate majority.

Asch (1956) showed that adult men (yes, Asch only had adult male participants) conformed to the majority to different extents: Out of the twelve critical trials where the unanimous majority answered incorrectly: 24 percent did not conform at all; 59 percent conformed on 1 to 7 trials; and 28 percent conformed on 8 to all 12 of the trials. Using replications of the paradigm, he further concluded that when participants gave their answers privately to the experimenter (instead of publicly in front of the confederates) conformity rates dropped markedly.

In parallel to Asch's work, Ruth W. Berenda conducted a series of experiments using Asch's stimuli and paradigm with children, making it the first developmental study on conformity using an experimental procedure. Identical to Asch's paradigm, the children's task was to identify the line from comparison card that was equal in length to a reference line. Groups of children who were picked to play majorities were informed prior to experiments that they would deliberately state erroneous answers unanimously and rehearsed this procedure carefully. Over a series of experiments, Berenda showed that children too were profoundly affected by false testimony, especially so when it was given by other children rather than by teachers. The reported effects were stronger among younger children (7-year-olds) than older children (13-year-olds; Berenda, 1950). Succeeding accounts of developmental conformity were quite scarce for the remaining part of century and mainly investigated conformity rates over childhood (e.g., Costanzo & Shaw, 1966; Gerard, Wilhelmy, & Conolley, 1968) showing that conformity rates generally decrease

over childhood, may surge in preadolescence, and then drop again in adolescence (e.g., Walker & Andrade, 1996). During the second half of the last century, there was also a shift in how children's behavior in conformity was to be seen, moving from a mechanistic imitation and situation-dependent behavior to a complex behavior in which children proactively control and interact with their social world (Thelen, Frautschi, Roberts, Kirkland, & Dollinger, 1981).

Following Asch's novel experimental paradigm, other researchers began to build on Asch's findings of social pressure's compelling effects and unveiling additional characteristics of conformity as we discuss it today. From a *situational* perspective, that is, observing overall conformity rates among participants, the effect of the majority's size and the participant's perception of distance between their own and the group's decision was shown (Goldberg, 1954). If the participant announces his or her opinion before the majority, and is confident in this initial judgement, the likelihood of conformist responding decreases (Thibaut & Strickland, 1956). Participants from collectivist cultures (i.e., cultures that emphasize group work and family; e.g., China, Korea, Japan) tend to conform more than participants from individualist cultures (i.e., cultures that emphasize individual achievement; e.g., U.S. and Western Europe; Bond & Smith, 1996) and younger adults tend to conform more than older adults (Pasupathi, 1999). From a *dispositional* perspective, that is, ascribing the propensity to conform to traits and endowments of individuals, the earliest reports had unfavorable views of conformity. For example, Crutchfield (1955) writes as a general observation:

“As contrasted with the high conformist, the independent man shows more intellectual effectiveness, ego strength, leadership ability and maturity of social relations, together with a conspicuous absence of inferiority feelings, rigid and excessive self-control, and authoritarian attitudes”. (p. 194)

Additionally, non-conformity was argued to be an index of status by which higher status men had more “idiosyncrasy credit”. More of such “credit” permitted more deviation from group expectancies (Hollander, 1958). Later studies on conformity propensity had a more value-neutral stance and described it as a dispositional attribute because of individuals' behavioral consistency over situations and contexts: Vaughan and White (1964) showed intra-individual correlations between questionnaire measures of acquiescence and three experimental procedures that tapped obedience and conformist behavior. From these observations, and because of the inter-individual variability in the propensity to conform, they suggested that conformity is best described as a trait that would most likely be normally distributed across populations. The first report that investigated personality traits found that conformity correlated with outer-directedness, as opposed to inner-directedness (a now obsolete instrument to assess individuals' sociability and preference for group harmony over

individualism and coerciveness; Back & Davis, 1965), which is very much in line with what could be expected if conformity is at least partially based on social group motivations.

Criticism of Asch's paradigm came from Allen (1965) and Willis (1965) and was mainly theoretical, highlighting that the paradigm does not allow for controlling *anti*-conformity, and argued likewise that this type of behavior was overlooked by their contemporary peers. Being anti-conformist is different from being non-conformist. Anti-conformity (also referred to as "maverick" responding), aims to highlight being different from others, regardless of whether the response is actually correct. In contrast, non-conformity is self-reliant and individualistic with an intent to produce an accurate response.

From a *descriptive* perspective, Deutsch & Gerard (1955) disentangles two discrete types of motivations behind conformity. They argued that participants might conform in an attempt to be accurate (informational conformity; when the task is difficult and the majority seem better informed or more knowledgeable than oneself) or to avoid ostracism (normative conformity; when the majority is clearly wrong but one conforms for social reasons). The first motivation thus involves epistemic while the second involves social concerns. The view of conformity as two distinct behaviors has received an abundance of empirical support (e.g., Insko, Smith, Alicke, Wade, & Taylor, 1985) and is central to present-day studies.

## The nature of conformity

### A multi-prompted and multi-motivated behavior

Conformity as behavior falls under the umbrella term *Social Influence* in which there are several partially overlapping conceptualizations. On the one end, there are the aspects of social influence that relate to authority and authoritarianism with constructs such as *obedience*, which includes persuasion and compliance; and *psychological manipulation*, which includes propaganda and abusive power. Importantly, the nature of these influences does not necessarily need to be negative as they also encompass, for example, experts' communication of public health advice to the general public in attempts to incite beneficial behavioral changes (e.g., health and nutritious eating habits, safe sex, or social distancing during pandemics). Whether negative or positive, this kind of social influence exerts its effect through authority figures or trusted sources and functions by adjusting individuals' attitudes or behaviors. In some varieties of social influence, authority figures use intimidation or appeal to participants' emotions using selective and incomplete information to mislead, and in others using unequivocally valid information to inform and constructively endorse favorable behavioral changes to the general public or

individuals. The common factor is that there is an intent in shaping or amending others' beliefs and behaviors and that this influence is aimed downwards – from authority figures or experts to those less empowered or less informed. On the other end, there are aspects that relate to socialization, learning, and peer pressure. Here, there are constructs such as majority and minority influence, relating to the proportions of a group that display a given behavior to a subject; social transmission, including culturally- and majority-biased transmission; and conformity. Within this end of the social influence spectrum, there may still be actual intent to shape beliefs or behavior, but the influence is horizontal between peers or generational within cultures and occurs without pressure from authorities or experts. When it comes to change in behavior resulting from social influence, Herbert Kelman (1958) identified three processes: *compliance*, *identification*, and *internalization*. Depending on the process involved, the nature of the behavioral change varies both qualitatively and in profoundness. *Compliance* is the least profound change and describes a change in overt behavior or attitude to match that of the others. Importantly, the covert – or private – attitude does not change. This means that compliance is similar to obedience in that an individual's observable behavior is adjusted, to match for example group norms or directives, in order to avoid ostracism, or to obtain expected social rewards while the individual still believes otherwise. The process of *identification* occurs when a subject is exposed to divergent attitudes from someone with whom the participant identifies, such as a role model, a respected group, or someone who is admired. Because of the relationship between subject and the other, adopting their behavior is intrinsically rewarding. This type of social influence is more profound than that of compliance. Thirdly, *internalization* describes the process in which the subject accepts and incorporates the others' behaviors or attitudes as their own norm. This is the most profound change and differs from compliance in that it reflects an actual change in beliefs held by the subject.

Robert Cialdini and Noah Goldstein (2004) had a different approach to describing social influence that departs from the individual's goals rather than the processes by which social influence occurs. They argued that in any individual there are three fundamental motivations relevant in a social context: The Goal of accuracy, the goal of affiliation, and the goal of maintaining a positive self-concept. These three goals interact with our social environment, thus creating processes in which we are affected outside of our awareness through subtle and indirect mechanisms. Firstly, they argue that the goal of accuracy is a central motivation for conformity – especially so, but not limited to – when we are uncertain ourselves. When faced with others' testimony, rates of conforming for the sole reason of being accurate increase when the perceived consensus among the others is high (e.g., Mackie, 1987). If a group of others is unanimously certain of something, it is taken as a clear indication that they are more than likely right. Furthermore, the likelihood of conformity also increases the smaller the difference is between individual's assessment

and the testimony of the unanimous majority. It is reasonable to believe that an objective consensus of others will be rated as trustworthy even by those with more expertise and that this effect is mitigated as the amount of perceived opposition between testimonies increases (Erb, Bohner, Rank, & Einwiller, 2002). The shorter the distance between an individual's initial testimony and the testimony of the others, the less effort needed to conform. Moreover, conformity driven by a goal of accuracy also increases when the task of forming an opinion is proportionally too cognitively taxing compared to its perceived relevance or importance (e.g., Erb, Bohner, Schmilzle, & Rank, 1998). That is, if a task of forming an opinion seems unimportant, we tend to use heuristics favoring the majority. Secondly, from a goal of affiliation perspective, Cialdini and Goldstein (2004) draw from a body of research on behavioral mimicry showing that we nonconsciously conform to confederates' posture, facial expressions, and mannerisms (Chartrand & Bargh, 1999). Our desire to affiliate with others, in both long- and short-term perspectives, introduces a bias in the link between perception and behavior due to increased attention to environmental stimuli (Lakin & Chartrand, 2003). We are thus non-consciously biased towards adopting views of others by desires to affiliate with them. We also conform, without necessarily being conscious of it, to others when we feel ridiculed, left-out, or rejected in order to restore both self-esteem and a sense of belongingness (Janes & Olson, 2000). Thirdly, Cialdini and Goldstein (2004) argue that conformity with the goal of maintaining a positive self-concept is supported by (1) a study showing that priming participants with self-worth attributes serves as a buffer against adopting the testimony of confederates (Arndt, Schimel, Greenberg, & Pyszczynski, 2002), and (2) that humans tend to conform to others even in anonymous online group settings, as long as they identify with the group's norms (e.g., Postmes, Spears, Sakhel, & De Groot, 2001). Taken together, Cialdini and Goldstein (2004) and Kelman (1958) show compelling evidence and convincing arguments that conformity, is driven by multiple motivational processes, as well as cognitive processes and needs for affiliation, to reach one or more out of several different ends.

### Situational influences on conformity

As covered in the previous section, several factors pertaining to the social interaction, perceived knowledgeableness, task importance, group dynamics, etc., have direct effects on conformity rates across samples of individuals. A rigorous meta-analysis by Rod Bond (2005) shows, among other effects, that the size of the majority plays a critical role: the larger the majority, the more likely the conformity but only when participants answer publicly in front of the confederates. When participants answer privately to the experimenter, the effect of the majority size is inconclusive and seem to depend on paradigmatic differences. Conformity in experimental settings is thus dependent on the par-

ticipant knowing that the confederates will be aware of their decision. However, anonymous settings show that if the participant identifies with the group, conforming can take place even when they know that the others are not aware of their identity (Postmes, Spears, Sakhel, & De Groot, 2001). This indicates that conformity is not necessarily driven by the opportunity to overtly signal to the majority that you are aligned with them: The collective identity of such groups can also encourage conformity. People conform to group norms to preserve their self-integrity, even when facing contradictory evidence, given that the collective identity of the group is salient. When the collective identity of the group is weaker, self-integrity is better maintained by forming opinions based on evidentiary rather than normative information (Binning, Brick, Cohen, & Sherman, 2015). In summary, unanimous majorities and knowing that one's answering or behavioral adjustments can be seen as in line with theirs, predicts conformity at the group level. Additionally, identifying with a group, especially a group with a strong group identity, can further increase conformist behavior.

### Theoretical perspectives on conformity

From an evolutionary point of view, that the ability to learn socially is an overall beneficial behavior to humans is prerequisite to its existence. We rely on social learning in the many cases where it is less costly than learning individually, or where learning individually is not possible (e.g., norms and culture). Formal evolutionary theory would predict that if the detrimental effects of conformity, such as its infringements on individualism, innovation, and independent formation of cognition and behavior, out-weighed its beneficial effects it would not have evolved to be such a central part of human social behavior. The question is then, how has conformity evolved, which other factors does it potentially depend on, and what are the benefits of conformity? Comparative studies broadened the perspective of developmental conformity by investigating whether other great apes also conform to majority testimony (see e.g., Claidière, & Whiten, 2012). Although such studies seemingly confirmed that, primarily chimpanzees, were sensitive to majorities' behaviors (e.g., Haun, Rekers, & Tomasello, 2012), it seems humans are the only primate that readily and frequently switches to a behavior displayed by others and additionally does so for normative reasons (Haun, Rekers, & Tomasello, 2014; Van Leeuwen, Cronin, Schütte, Call, & Haun, 2013; Van Leeuwen, & Haun, 2013). Daniel Haun and Harriet Over (2015) argue that homophilic preferences (i.e., the favoring of similar others) in humans (and other animals) can help explain behaviors such as species-general majority-biased transmission and the human-specific normative conformity. Because children and adults prefer to interact with, engage with, and learn from individuals that are similar to themselves, imitating and conforming to group norms make us even more similar to them. Being similar to in-group others is, in turn, beneficial because

it strengthens the individual's bonds and affiliation with the group. High-fidelity imitation within groups creates group-level norms that underlie the cultural transmission of norms over generations as children imitate their group's behaviors.

From a different angle, van Schaik & Burkart (2019) argue that the evolution of conformity is entangled with evolution of normativity and morality. They base this argument on a series of anthropological points. Firstly, social learning (viz., social transmission of knowledge) was extant already in our early anthropoid ancestors and observable in all great apes. Secondly, this transfer of knowledge was key to mastery in a skill-intensive environment of a hunter and gatherer culture. Thirdly, they argue that because social transfer of knowledge occurred it means both that members were interdependent and that it was beneficial to their group when more knowledgeable individuals shared knowledge with naïve others. Obtaining information from knowledgeable others was crucial for groups' efficiency and decision-making, yet the sharing of information was not necessarily associated with external rewards for those who shared. They further suggest that prosociality and morality emerge here because of members' concern for reputation and fear of punishment. If an individual is thought to have information that it does not share with the group, the individual will be seen as uncooperative. Groups rely on each other that knowledge and skills are transferred to other group members, ultimately forming group norms and thereby laying a foundational requisite for conformity.

From a neuroscientific perspective on conformity, Shamay-Tsoory, Saporta, Marton-Alper, and Gvirts (2019) present a multilevel theory of social alignment. In this theoretical framework, neural and hormonal influences underlie emotional contagion (mirroring others' emotions; Prochazkova & Kret, 2017), synchronized movements (posture mimicking and synchronization of rhythmic movement; Varlet, Marin, Lagarde, & Bardy, 2011; Keller, Novembre, & Hove, 2014) and conformity. These are seen as linked alignment systems of motor, emotional, and cognitive domains that are respectively encapsulated in an overarching core alignment mechanism. For example, activity level in the anterior insula (AI; primarily involved in encoding emotions) and activity level in the ventral striatum (VS; part of the reward system) which reflects valuation of conflicting stimuli (e.g., perceptual versus social information), are both predictive of conformist responding (Campbell-Meiklejohn, Bach, Roepstorff, Dolan, & Frith, 2010; Huber, Klucharev, & Rieskamp, 2015). This indicates that multiple processes of error detection, reinforcement learning mechanisms, and appraisal of emotions work in concert to potentially modify cognition (Schnuerch & Gibbons, 2014; Wu, Luo, & Feng, 2016) and differences in conformity behavior (Pei et al, 2020). Shamay-Tsoory and colleagues' (2019) theory additionally builds upon the human herding behavior (quite complex group behaviors can emerge among groups from local interactions without any central coordination; Raafat, Chater, & Frith, 2009) as well

as predictive coding framework theory (e.g., Kilner, Friston, & Frith, 2007) which draw from the mirror neuron system of inferring intentions from others' action. From this point of view, conformity can be seen as one of many behaviors that have evolved to strengthen bonds between groups – and are motivated and grounded by common social abilities.

Computational models simulating social information transmission lend support to similar ideas of the evolution of conformity. For example, Henrich and Boyd (1998) showed that conformist transmission (the tendency within a group to copy the majority) is intrinsic to social learning, primarily emerges in unstable environments, and sustains within-group similarities (the latter has been further nuanced by Denton, Ram, Liberman, & Feldman, 2020). Guzmán and colleagues (2007) additionally show that conformist transmission is most strongly favored in groups that facilitate altruistic behavior in various cooperative dilemmas. That is, for example, that conformist transmission is more likely in groups where individuals place the group's needs before their personal needs. Increases in conformity additionally allow group sizes to increase while sustaining cooperation (Guzmán, Rodríguez-Sickert, & Rowthorn (2007). Taken together, there is anthropological, evolutionary modelling, neuroscientific, and comparative psychological support for theories describing conformity as intrinsic to an array of social and prosocial behaviors that are part of a core which advances human cooperation, altruism, efficient social learning, – and is perhaps even part of what make us *human*.

## Dispositional influences on conformity

The research covered thus far primarily investigates functional aspects – both evolutionary and neurological, as well as cultural and situational aspects of conformity. Here I will address dispositional factors of conformity and shed light on what differs between individuals with different propensities to conform. In all reports of conformity, whether laboratory experiments or more ecological observation studies, there is large variability in conformist behavior: Some individuals conform more often while some seem to be more resilient to acquiesce or adopt the behaviors of others. For example, lower scholastic achievement is predictive of conformity, especially so if the majority has higher achievement than the participant (Uchida, Michael, & Mori, 2020). IQ is also predictive of conformity – but here the relationship is U-shaped and both low and high IQ predicting greater than average conformity. This suggests that the highest IQ individuals strategically use conformist-biased social learning to a larger extent and lowest IQ individuals more often defer to experts (Muthukrishna, Morgan, & Henrich, 2016).

Dispositional factors that are related to an increased propensity to conform cover a wide range of psychological constructs, including cognitive ability and type, as well as somewhat inconclusive findings on personality traits. Having

high social anxiety is predictive of conforming for the reason of avoiding negative evaluations by confederates, but can also predict non-conforming as a means of avoiding social interaction (Zhang, Deng, Yu, Zhao, & Liu, 2016). Experimental and correlational evidence support that individuals' belief in the concept of free will buffer majority opinion, that is, decreasing belief in free will makes participants more sensitive to others opinions, while increasing belief in free will makes them less sensitive (Alquist, Ainsworth, & Baumeister, 2013). However, such effects have not been replicable using similar methods (e.g., Smith, 2019). Moreover, need-for-uniqueness, a psychological construct that taps individuals' motivation to compensate and avoid a sense of feeling indistinguishable from others, has been shown to drive nonconformity (Imhoff & Erb, 2009). It has also been shown that conformists are more stable and rigid, and less likely to adopt to novelty (DeYoung, Peterson, & Higgins, 2002).

Fewer studies have investigated the roles of personality in conformist behaviors. In psychology, personality is an attempt to characterize and measure psychological differences between individuals. Most often, such research on personality and individual differences use the Five-Factor-Model of personality (FFM). The FFM comprises the five dimensions *Openness to Experience* (curious; appreciative of arts, adventure, and new things), *Conscientiousness* (self-disciplined; regulated; dutiful), *Extroversion* (surgency; enjoying social interactions; enthusiastic), *Agreeableness* (considerate; concern for social harmony; helpful), and *Neuroticism* (anxious; low stress tolerance; pessimistic). A notable exception to the dearth of studies on this topic was recently published by Wijenayake, van Berkel, Kostakos, and Goncalves, (2020) who report that neuroticism and conscientiousness seem to have effects on adults' normative conformity in an online context. The effect of neuroticism, or emotional (in)stability, is in line with previous reports on the effect of social anxiety (Meunier & Rule, 1967; Zhang et al, 2016), but the reason behind the effect of conscientiousness (careful, responsible, and diligent) is less conspicuous. They argue "Individuals with high conscientiousness may doubt their answers when facing a contradicting majority and accept the majority's judgement to be more accurate than their own perception of the same situation" (Wijenayake et al, 2020, p. 9). Perhaps the willingness to get it right makes highly conscientious individuals more sensitive to others' feedback.

## Gender differences

The earliest work on conformity mostly investigated men's behaviors (e.g., Asch, 1956; Crutchfield, 1955; Sherif, 1937), and the first reports investigating gender and sex differences suggested minor effects in line with women generally being more prone to conforming (e.g., Crano, 1970). As studies broadened to include both men and women, using gender-specific or mixed-

gender confederates in Asch-style conformity paradigms, a robust meta-analysis indicated that women conform more than men do, at least in the U.S. where the bulk of studies were conducted (Bond & Smith, 1996). Across individual studies, these effects were generally of small to moderate size, and it has been speculated that gender differences in status and gender roles explain this effect best (Eagly & Chrvala, 1986), somewhat in line with the notion of “idiosyncrasy credit” (Hollander, 1958). However, in more recent studies, this effect has not always replicated (e.g., Rosander & Eriksson, 2012, Ušto, Drače, & Hadžiahmetović, 2019; Wijenayake, van Berkel, Kostakos & Goncalves, 2020), and when it has, it has been attributed to other gender-specific trait differences, such as gender differences in confidence level (Cross, Brown, Morgan, & Laland, 2017).

## Children’s conformity

From an early age, children are influenced by majorities, conform to majorities, and imitate others just as adults do. There also seems to be similar variability in the propensity to conform across children as adults. Whiten and Flynn (2010) cleverly showed how such differences can evolve in miniature communities of young children by having single children model different tool use solutions to a novel toy to their respective individual groups. Over the next few days, a majority of peer children had learned their group’s solution socially by observing the models while others instead innovated novel solutions. There was thus a natural variability within groups of children ranging from social learners to innovators. Interestingly, novel solutions introduced by innovating children were socially transmitted in parallel with the initial solutions, showing that dynamic social relationships of children evolved on miniature scale into small cultures based on tool use solutions.

In replications of Asch’s (1951; 1956) studies, using 3- and 4-year-old participants, children conform to an erroneous majority in about the same proportions as adults do, both to adult (Corriveau & Harris, 2010) and peer confederates (Haun & Tomasello, 2011). Importantly, in both above-mentioned studies it was shown that most conforming children did indeed answer correctly, without conforming when later asked privately. This indicates that the majority of conforming children had conformed with a normative motivation. Five-year-olds can additionally construe conformity as means of affiliation (Cordonier, Nettles, & Rochat, 2017) and eight-year-old children even conform for normative reasons to humanoid robots (Vollmer, Read, Trippas, & Belpaeme, 2018).

In the following section I will first discuss early social learning behaviors in children, namely conformity and over-imitation – two similar variants of social and cultural transmission (Whiten, 2019). Secondly, I will discuss differences in conformity by age, and effects of consensus and trust.

## Over-imitation

Horner and Whiten (2005) originally described a phenomenon in which children imitated causally irrelevant behaviors when observationally learning how to perform a task from a model. In their study, children and chimpanzees observed a human model solve a puzzle box using a range of causally relevant and irrelevant steps. In one condition, the puzzle box was opaque and there was no way for the children or chimpanzees to determine which steps were relevant and which were not. Hence, both children and chimpanzees unsurprisingly imitated all the steps to solve the puzzle box. In the second condition, the puzzle box was transparent thus providing information to the observer which steps were causally relevant and which were not. The chimpanzees efficiently discarded the steps that were causally irrelevant. Human children, on the other hand, continuously imitated the steps that obviously had no causal relevance, which was argued to reflect an increased susceptibility to cultural conventions in humans (Horner & Whiten, 2005).

The seemingly irrational and inefficient strategy of copying others' irrelevant actions is intriguing: Why do children "blanket copy" causally irrelevant steps to obtain an instrumental goal? It has been suggested that children imitate automatically, reflecting cultural learning of causally opaque behaviors (Lyons, Young, & Keil, 2007), that they are expected to perform all actions (e.g., Lyons, Damrosch, Lin, Macris, & Keil, 2011), or that they conform to the demonstration believing that it is normative (Kenward, Karlsson, & Persson, 2011). In support of the first argument, that it reflects learning of causally opaque behaviors, Wood, Kendal, & Flynn (2013) show that children who have mastered an efficient strategy before witnessing the modelling of surplus causally irrelevant steps do indeed incorporate them into subsequent trials. Perhaps such behavior, although being detrimental to short term efficiency, overall is an effective strategy which reflects humans' acquisition of, for example, cultural norms and making it efficient in the long term. Again, such over-imitation is strongest among children who witness peer or older models and is weak when models are younger – regardless of familiarity or participant's age (McGuigan & Burgess, 2017). In a recent study on over-imitation, 4- to 6-year-old children observed four adult models solve a transparent puzzle box. The degree of consensus among adults was varied across conditions so that all models, a majority of three, a minority of one, or none of them performed additional causally irrelevant actions. Results showed that children were only over-imitating to great lengths in the condition where the four adult models unanimously displayed the same causally irrelevant actions. Over-imitation dropped markedly as soon as a minority model displayed that the puzzle box could be opened more efficiently. This indicates that children adopt a highly flexible learning strategy in which they are able to integrate social information from several sources (Evans, Laland, Carpenter, & Kendal, 2018).

Over-imitation seems to be the exaggerated copying of ostensibly irrelevant behaviors when doing so is seen as normative. Over-imitation can thus be related to conformity. As consensus within a group of models demonstrating causally irrelevant actions drops, so does the extent of children's over-imitation. Likewise, if all models are doing something in a certain way we may infer that there is likely something to the seemingly irrelevant actions that is unseen or unknown. Blanket copying of others in the light of having made such an inference is then a functional heuristic, comparable to informational conformity. Again, children's over-imitation drops with model consensus because the probability of missing something unseen or unknown is diminished when models are seen obtaining the same instrumental end using only the causally relevant actions. McGuigan and Robertson (2015) show a clear similarity in the patterns of behavior for over-imitation and normative conformity: Three- and four-year-olds who demonstrated that they were able to solve a transparent puzzle box using only causally relevant actions switched to producing the additionally irrelevant actions when the peer who modeled them returned to observe them. Such a switch in strategy is a manifestation of normative conformity. Hodges (2014) argues that imitation and conformity are manifestations of children's (and adults') motivation to learn about others and the world – that imitation is not blindly following but rather reflects an engaged and embodied dialogical relationship between humans and their social worlds. Additionally, recent reviews have also highlighted that the phenomenon of over-imitation is a highly functional and flexible learning strategy involving causal- and normative reasoning as well as affiliative and cognitive accounts (Hoehl, Keupp, Schleihauf, McGuigan, Buttelmann, & Whiten, 2019) and that over-imitation conceptually overlaps with conformity as both are social learning phenomena that can be both informationally and normatively motivated (Whiten, 2019).

The conceptual difference between over-imitation and conformity is not set in stone. Whiten (2019) suggests that such delineation and categorization should not be resolved empirically. Rather, whether over-imitation should be seen as a unique form of conformity – or as conceptually entangled with conformity – is subsidiary to the benefits of the use of different perspectives to propel research in this field. A distinction from a more practical perspective can be made using differences in the respective paradigms: Over-imitation is operationalized as behavioral imitation whereas Aschian conformity is operationalized as switching opinion from perceptually derived information to match the opinion of others. Moreover, this contrasting opinion of others found in conformity experiments is more salient than surplus causally irrelevant actions found in over-imitation paradigms, this is because these are supplementary and irrelevant – and not explicitly conflicting. Therefore, over-imitation does not require a diametrical change of subjects' beliefs which is the case in conformity.

## Effects of Age

As indicated by earlier studies on developmental conformity, conformity rates tend to decrease over childhood up until early adolescence (e.g., Costanzo & Shaw, 1966; Gerard, Wilhelmy, & Conolley, 1968; Walker & Andrade, 1996). More recent studies support this trend, 3-year-olds conform more than 5-year-olds to adult models (e.g., Flynn, Turner, & Giraldeau, 2018) and 5-year-olds conform more than 8-year-olds do to groups of same-age peers (Misch & Dunham, 2021). Five-year-olds are able to withstand peer pressure from an anti-social peer majority and act prosocially (Engelmann, Herrmann, Rapp, & Tomasello, 2016). Similar investigations of susceptibility to antisocial majorities show a negative correlation between age and likelihood of conforming to peers' transgressions of social and moral conventions, such as being mean to third-party children (Kim, Chen, Smetana, & Greenberger, 2016).

There are also indications that the decrease in conformity propensity later in childhood halts, and conformity rates may even increase during teenage years (Zhang, Zhang, Mu, & Liu, 2017). During preschool and early school years, there thus seems to be a quite clear function of age when it comes to propensity to conform. However, these findings do not necessitate that the age-dependent effect of conformist propensity is driven by younger children's need for affiliation. For young preschoolers, several lines of evidence support that 3-year-olds are more credulous to false information or false testimony given by adults than 4- and/or 5-year-olds are (Koenig & Harris, 2005; Ma & Ganea, 2010; Schillaci & Kelemen, 2014). Such credulity is also biased by in- and out-group parameters, for example, 4-year-olds are less susceptible to false information provided by adult models with foreign accents, whereas 3-year-olds are equally credulous to both native and foreign-accented models (McDonald & Ma, 2016). This indicates that younger children's conforming behavior need not be motivated by higher levels of need to follow norms or higher susceptibility to majority testimony – but can also be explained by the development of cognitive functions to discern in- and outgroups.

Being aware of others' judgements affects our own. Others' conflicting testimony has not only a social value to which children may conform, but also an epistemic value: Children are sensitive and susceptible to others opinions or testimonies, especially if the others are unanimous. It has been argued that three-year-olds have strong biases towards trusting testimony in general, because even when they clearly see an event (stickers being placed in a contained) they are still misled by false testimony (being told that the sticker is in another container; Jaswal, Croft, Setia, & Cole, 2010). Part of this effect may be explained by poorer source monitoring, that is, confusing sources of information (Lindsay, Johnson, & Kwon, 1991). With that said, three-year-olds may recognize false testimony, yet fail to generalize that information to predict whether the person is trustworthy when giving subsequent testimonials (Koenig & Harris, 2005). However, when a person repeatedly gives testimony

that turns out to be false or misleading, both three- and four-year-olds consider their future testimony to be unreliable (Jaswal & Neely, 2006). When it comes to groups' consensus and expertise, children tend to trust adults more than peers – even when the adults are unfamiliar and the peers are familiar (McGuigan & Stevenson, 2016).

Moreover, groups and majorities represent norms. These can be descriptive (how group members are) and prescriptive (how group members ought to be; e.g., Bear & Knobe, 2017). Younger children also infer that groups' descriptive norms are also prescriptive to a larger extent than older children do (e.g., Roberts & Horii, 2019). That is, believing that how groups *are* dictates how their respective group members *should be*. Four-year-olds also give more negative evaluations of non-conformists than older children do (Roberts, Gelman, & Ho, 2017). Such inferences constitute biases to conform as it leads to an inflation of the value of normative behavior.

The skills to acquire knowledge socially and asocially (e.g., own experience) develop over preschool age, and being rational learners, children learn when to make trade-offs and trust selectively (e.g., Sobel & Kushnir, 2013). What best explains the negative correlation between age and conformity propensity could be a multitude of factors, including being more confident and thereby more sensitive and skeptical to conflicting testimony (e.g., Harris, Koenig, Corriveau, & Jaswal, 2018) maturation of cognitive abilities, selective attention to social cues (e.g., source monitoring), or an increasing complexity of understanding of both the self in relation to others and groups' norms.

## Effects of Consensus

What happens when a majority providing testimony is not unanimous? Already by the age of two, children are more likely to imitate a behavior displayed by three unanimous individuals than the same behavior thrice by one individual (Haun, Rekers, & Tomasello, 2012), which strongly indicates early ontogenetic roots of consensus' social and epistemic value. Likewise, such valuation of consensus information (or the social pressure to conform to the majority) would decrease if there is an alternative opinion – and even more so if the alternative opinion is in line with the participant's opinion. Although these assumptions would be fairly correct, there is of course more to it than that. Evidence points clearly to three-year-olds being most susceptible to unanimous majorities, that is, they do not conform to the same extent as adults or older children to non-total majorities (e.g., Morgan, Laland, & Harris, 2015). The reason for this may lie in 3-year-olds' inability to see non-total majorities as being able to be normative – leading to non-total majorities losing power to socially transmit normative behavior or opinions to young preschoolers (Schmidt, Rakoczy, Mietzsch, & Tomasello, 2016). Parts of the integration of social information into children's formation of judgements and

knowledge about their world is thus developing quickly over the preschool years, from imprecise and blunt – to complex and adaptive (Morgan, Laland, & Harris, 2015).

Three- and four-year-olds tend to be strongly influenced by majority opinion and trust individuals who belong to a majority more than individuals who are presented as dissenters (e.g., Corriveau, Fusaro, & Harris, 2009). However, four-year-olds are sensitive to the epistemic grounds of a consensus – showing less trust to majority testimony when they are informed that it is unwarranted (Kim & Spelke, 2020). By the age of five, they can choose to trust a dissenter if they perceive them to be more informed or competent (Einav, 2014) and by the age of six, children start to trust majorities with a consensus based on individual's own experiences more than majorities whose unanimous testimony is influenced by each other's judgements (Einav, 2018).

## Gender Differences

When it comes to Aschian conformity in preschool-aged children, there is little evidence that suggests notable gender differences. Most recent studies collect gender data but exclude it from analyses as no effects were found in preliminary analyses (Engelmann, Herrmann, Rapp, & Tomasello, 2016; Kim, Chen, Smetana, & Greenberger, 2016; McGuigan & Stevenson, 2016) while some studies report mixed findings (e.g., Haun & Tomasello, 2011). Reports of older Japanese children as participants indicate an adolescent gender difference starting around the age of 10 years (Mori, Ito-Koyama, Arai, & Hanayama, 2014) with girls being more prone to conform to peers than boys. In contrast to this finding, girls have been reported to be more resistant to peer pressure than boys during this period (Sumter, Bokhorst, Steinberg, & Westenberg, 2009), indicating context dependent effects. This suggests that conformity is not *strongly* linked to differential attributes of children's gender roles nor to general skills with gender differences, at least not until during later childhood.

## Areas of interest in relation to Conformity

Despite the robust evidence that conformity is prevalent in humans' lives from a young age, there is still much that is unknown about it. In this section I will discuss the avenues of conformity research relevant to the current work, namely those of personality traits, and parental style; as well as linkages between conformity and other social behaviors and how they are proposed to relate to conformity.

## Children's Personality

There are many models of personality (for a comprehensive review and comparison of personality models, see Feher & Vernon, 2021) but in the current works I have focused on the FFM; Goldberg, 1990). When assessing individual differences in infants and young children, FFM is not always a suitable model as characteristics of infants differ qualitatively from adults' and older children. Instead, models of temperament have been employed to describe individual differences in such samples (see, e.g., Gartstein & Rothbart, 2003). Aspects of individual differences that distinguish infant temperament (as conceptualized by Gartstein & Rothbart, 2003) from FFM personality is (1) the use of three dimensions (Surgency; Negative Affect; and Effortful Control); and (2) that temperament is seen as a core foundation, almost exclusively contingent on genetic and biological factors – while personality is a product of life experience, biological factors, and their interactions (Rothbart & Bates, 2006). The transition from rudimentary temperamental individuality in e.g., soothability (i.e., reduction of distress when soothed by caregiver) and characteristic mood into broad and more consistent outlines of dispositional characteristics begins to appear around two years of age (McAdams & Olson, 2010). Although *modus operandi* when assessing individual differences in preschool children have been to employ models of temperament to both infants as well as preschool children, relatively recent evidence show that FFM can be adapted to assess even young preschool children's individual differences reliably and with conceptual validity (Grist & McCord, 2010). Beyond FFM being more nuanced than models of temperament, it also facilitates comparison and generalization of individual differences from the developmental samples in the current works to older children and adults.

Temperament and foundations of personality are to some extent genetically determined (Power & Pluess, 2015), and also contingent on and shaped by environmental and social factors. It has been shown that three-year-old children's behavioral patterns and characteristics are predictive of cognitive, behavioral, and emotional characteristics at the age of 26 (Caspi, Harrington, Milne, Amell, Theodore, & Moffitt, 2003). Moreover, trait stability of FFM is consistent over preschool years (Zupančič, Sočan, & Kavčič, 2009), shows moderate stability from early childhood into adulthood for both boys and girls, including facets of the five main dimensions (de Haan, De Pauw, van den Akker, Deković, & Prinzie, 2017), and is predictive of parentally reported social behaviors (Zupančič, & Kavčič, 2005). Yet, in spite of developmental research showing temporal validity and ease of implementation of personality measures in children, individual differences research in children's social behavior is very limited. The majority of published developmental works in which models of personality are implemented concern clinical groups, academic achievement, or risk-behaviors. However, a recent study in which a personality model similar to FFM was employed (HEXACO, which includes

sixth dimension of honesty-humility; Allgaier, Zettler, Göllner, Hilbig, & Trautwein, 2013) showed that parental ratings of 7-11-year-olds' honesty-humility were predictive of fairness behavior as assessed in economic games.

Even in the adult literature, the individual differences perspective on conformity is scarce, as described earlier in this chapter. Yet if we look at comparative studies, personality indeed predicts social learning behavior in primates. In a field experiment, wild baboons were scored on boldness (response to novel foods) and anxiety (response to venomous snake) to see if these dispositional traits would predict social learning from a conspecific who demonstrated how to solve a task. Results showed that low-anxiety juveniles spent more time observing the demonstration, although this did not correlate with actual ability to solve the task. Additionally, bolder individuals were more successful in solving the task regardless of time spent observing (Carter, Marshall, Heinsohn, & Cowlshaw, 2014). Whether the baboons' time spent observing actually reflected more obtained information is unclear – the linkage between primate personality traits and their social learning ability is intriguing. Although baboons' response to novel foods seem to overlap more with human Openness to experience, it has shown to be reflect an aspect of baboons' characteristics that is related to their overall boldness (see Carter, Marshall, Heinsohn, & Cowlshaw, 2012, for a discussion). In humans, boldness is inherent to the temperamental and personality traits of extroversion. Relatedly, three-year-olds who score high on a dimension of extroversion/affect (see Bayley, 1969, for scoring) show higher levels of selective trust, indicating a link between social learning accuracy and personality (Canfield, Saudino, & Ganea, 2015). Moreover, in adults, extroversion scores are predictive of stronger neural activation patterns to social stimuli: In an EEG experiment, highly extroverted individuals displayed a stronger P300 ERP in response to human faces than less extroverted individuals (Fishman, Ng, & Bellugi, 2011), indicating a larger allocation of attention and enhanced motivational significance to social stimuli among extroverts. This implies that extroversion scores tap, perhaps some underlying construct, which entails attention to social stimuli. Taken together, these studies suggest that extroversion, as it entails attention to social stimuli and a comparative link to social learning, is a candidate factor for exploratory studies on children's conformity taking an individual differences perspective. This analysis is shared with Rawlings, Flynn, & Kendal (2017) who additionally suggest that “extraverted personality types and those central in their social networks are more likely to use social information and copy others”.

Few studies have investigated the dispositional characteristics that potentially influence children's social learning, sensitivity to social information, or conformity. This gap has been noted by several developmental social psychology researchers (e.g., Marble & Boseovski, 2020; Rawlings, Flynn, & Kendal, 2017). For example, Rawlings et al. (2017) state “We need to understand how

personality and position in a social network interact in children, and how this interaction shapes the learning strategies children adopt” (p. 44).

## Parental effects

Parents’ child rearing strategies and manners toward their child make up a central psychosocial domain of children’s worlds. Darling and Steinberg (1993) argue that parenting styles are best described as contexts in which children are socialized. Children, being active agents who to a large extent depend on social interaction with their parents to learn about their world (e.g., Gredebäck, Fikke, & Melinder, 2010), are without doubt affected by the quality and types of such contexts. As outlined below, effects of parents’ characteristics suggest that other than the child’s dispositional characteristics, there is also a potential source of individual variability in conformity propensity explained by the factor of parenting style.

Parenting behaviors are to some extent uniquely determined by characteristics of the parent (Prinz, Stams, Deković, Reijntjes, & Belsky, 2009), but are also influenced by the infant’s behavior and the bi-directional relation that evolves in the parent-child dyad (Ayoub, Briley, Grotzinger, Patterson, Engelhardt, Tackett, Harden, & Tucker-Drob, 2019; Clark, Kochanska, & Ready, 2000; Zadeh, Jenkins, & Pepler, 2010). Parenting style is complex and may be inconsistent over time as well as differentiated between siblings within a family (e.g., due to age differences), and is susceptible to qualitative alterations by both dyadic interactions and extrinsic environmental and societal factors. Parenting style can be described from several perspectives and qualitatively different conceptualizations and measurements. Yet, from an empirical perspective in which explanatory power over outcomes is considered, one model has persistently stood out for 50 years. Diana Baumrind (1968; 1971) delineated three independent main styles of parenting: *Authoritative* (demanding and responsive), *Authoritarian* (demanding and non-responsive), and *Permissive* (non-demanding and responsive). In her framework, authoritative parenting is characterized by being child-centered, democratic, and regulating; authoritarian parenting is verbally hostile, non-reasoning, and punitive (in some countries also including corporal punishment, which is illegal in Sweden as of 1966); and permissive parenting is characterized by nurturing, accepting, but with few expectations of, or demands on, the child.

Authoritarian and permissive parenting styles have been linked to externalizing behaviors (Pinquart, 2017; Tavassolie, Dudding, Madigan, Thorvardarson, & Winsler, 2016) and there is a large consensus across the fields of developmental and family psychology that authoritarian parenting is detrimental to children’s social and behavioral outcomes, as indicated by increases in aggressiveness and anxiety (e.g., Muñoz, Braza, Carreras, Braza, Azurmendi, Pascual-Sagastizábal, Cardas, & Sánchez-Martín, 2017). With that said, au-

thoritarian parenting style is indeed associated with the trait of authoritarianism as parents' self-reports of both constructs correlate moderately (Manuel, 2006). Authoritarianism is an individual predisposition to prefer more coercive prescriptive social and moral norms and to have stronger biases against different others (e.g., Stenner, 2009) but also cognitive differences reflected by a greater reliance on heuristic processing (Kemmelmeier, 2010). It is thus an attitudinal construct pertaining to cognitive and psychological domains whereas authoritarian parenting is a behavioral construct pertaining to socio-cognitive and inter-relational domains. Using measures of parents' authoritarianism, a study showed that children of parents who were high on authoritarianism placed more trust in adults who adhered to conventions than did peers whose parents were low on authoritarianism (Reifen Tagar, Federico, Lyons, Ludeke, & Koenig, 2014). In another interesting study, children's conformity was assessed using an Asch-style paradigm and related to parents' right-wing authoritarianism (RWA), a construct reflecting willingness to submit to authorities seen as legitimate and to adhere to traditions and norms (see Altemeyer, 1988). Results showed that maternal, but not paternal, RWA was positively correlated with children's conformity (Guidetti, Carraro, & Castelli, 2017) suggesting that parental attitudes and ideology carry a significant influence on children's social behavior.

Parental characteristics are a largely overlooked avenue for exploring individual differences in conformity. It has been suggested that authoritarian parenting inherently promotes conformity in children (Berger, 2014). Research also suggests that highly-reactive children's social competence and peer interactions are influenced by parent's child rearing style, specifically the dimension of authoritarian parenting style (Gagnon, Huelsman, Reichard, Kidder-Ashley, Griggs, Struby, & Bollinger, 2014). The parents are of course a central part of children's early childhood, and their strategies and manners largely influence how their children learn to interact with their respective social worlds.

In addition to parents' child rearing style, their dispositional characteristics are also thought to influence children's early social worlds – either directly (Browne, Meunier, O'Connor, & Jenkins, 2012) or as an interaction with children's dispositional characteristics and parental style (e.g., Coplan, Reichel, & Rowan, 2009). For example, children whose parents are highly extroverted are likely to be exposed to more adult interactions and richer social environment than children whose parents are more introverted. Fathers' extroversion has been demonstrated to be predictive of four-year-olds' prosocial behavior (Ortiz & Barnes, 2018), suggesting effects of parental personality on children's social behavior.

## Other Social Behaviors

There are several established test protocols for investigating various social behaviors in children, most of which are well-researched and related to other abilities or dispositions. Two notable examples of such social behaviors are altruism and obedience. Altruistic behavior is a behavior that is carried out for someone else's benefit, and may even be costly for the individual who performs it. Although there are "pre-altruistic" behaviors in infants, altruism can be motivated by concerns for others' well-being in a more mature and full form at around two years of age (Dahl & Paulus, 2019). Whether sensitivity to others' welfare shares underlying mechanisms with other social information processing, such as those valuing social information or affiliation needs, is not known. Obedience is another example of a social behavior that is interesting to relate to conformity. Obedience and conformity are conceptually overlapping in some respects. Most notably the acquiescence of instructions or expectations implicitly (conformity) or explicitly (obedience), and a change in behavior to align with a majority (conformity) or authority figure (obedience).

### **Altruism**

Altruism, a selfless prosocial behavior in which the benefactor even may face a cost for engaging, is argued to have early ontogenic roots (e.g., Hepach & Warneken, 2018) as precursor mechanisms of fairness preferences can be observed already at the age of 12 months (Geraci & Surian, 2011). 18-month-olds instrumentally help others and may also comfort adults who simulate sadness (Schuhmacher, Collard, & Kärtner, 2017). These studies indicate that prosocial behavior and concern for others do not depend on a fully-developed theory of mind (the ability to attribute others' emotions, thoughts, knowledge, etc.). On the one hand, it is argued that theory of mind is foundational to social interactions and allows young children to form a more objective representation of their worlds (when including others' perspectives to one's own), leading to more normative representations of groups and communities (Tomasello, 2020). In line with a needed requisite understanding of norms and identifying something as normative in order to conform, Gummerum, Hanoch, Keller, Parsons and Hummel (2010) demonstrated a link between preschoolers' ability to identify and attribute emotionality to moral norm violations and altruistic sharing behavior. That is, understanding the emotional consequence of a moral violation indicates an understanding of a moral norm, and predicts a more generous sharing of resources. Correlational evidence further supports that children who display theory of mind also display more fairness (Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010). On the other hand, however, when experimentally elicited, other studies suggest that theory of mind does not predict altruistic behavior in preschoolers (Liu, Huang, Xu, Jin, Chen, Li, Wang, Song, & Jing, 2016) and that altruistic behavior is likely more

driven by empathy than theory of mind (Sally & Hill, 2006). Benenson, Pascoe, and Radmore, (2007) found that socioeconomic background predicted altruistic sharing behavior and suggested it might be reflected by socialization practices. In line with that, Paulus, Becker, Scheub, and König (2016) showed that 5-year-olds' attachment pattern – an aspect of the child-parent relationship describing the extent to which the child sees the parental figure as a secure base – did as well. Altruism or altruistic behavior may thus in some contexts be facilitated by theory of mind – but theory of mind is not a prerequisite. Infants and preschoolers may also act selflessly despite a lack of this ability or by motivations that are not grounded in this ability.

But prosocial helping isn't always unconditionally selfless. Preschoolers can also act prosocially for strategic reasons, for example in anticipation of being reciprocated (Kenward, Hellmer, Winter, & Eriksson, 2015). Yet, acting prosocially or altruistically for a strategic reason is dependent on knowing that you are being watched. 5-year-olds are able to act more prosocially if they know that they are being seen by others (Engelmann, Herrmann, & Tomasello, 2012). Later studies suggest that such abilities are emerging already at three (Richards, 2017) or even at 2 years of age (Botto & Rochat, 2019). Such motivations for costly prosocial behavior, which can ostensibly be seen as altruistic, does indeed likely depend on theory of mind and cognitive processing that is not available in children younger than three years.

## **Obedience**

There are few studies on children's obedience. When it comes to experimentally elicited measures of obedience that are not based on clinical samples, there are to my knowledge only two studies. Landauer, Carlsmith, and Lepper (1970) investigated to which extent four-year-olds obeyed their mother as well as other children's mothers in an experimental setting. The tasks they were instructed to perform included spending time in a part of the lab room devoid of toys, picking up blocks, and carefully watching an anesthetized mouse. Results showed remarkable inconsistencies: children's obedience to their own mother did not predict obedience to other children's mothers, nor did mothers' ability to command obedience from one child predict this ability from another child. The second study is a controversial and arguably inappropriate replication of Milgram's obedience study using children aged 6-16 (Shanab & Yahya, 1977).

As outlined above, conformity and obedience share the fundamental features of acquiescing to instructions or expectations, as well as a behavioral change to align with these. In this context, obedience and conformity can also be related to instrumental helping. Instrumental helping is defined as assisting another in achieving an action-based goal (compare with *empathetic helping* which entails a prosocial response of concern for another's well-being, e.g. comforting; Svetlova, Nichols, & Brownell, 2010; Warneken & Tomasello, 2007). Yet there are three main features which distinguish obedience from

instrumental helping: (1) *Behavior initiation*, obedience is exclusively initiated by an authoritative or authoritarian explicit request (Milgram, 1963), while instrumental helping can additionally be motivated by a concern for another (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992) or an interest in what they are doing (Rheingold, 1982); (2) *Behavior motivation*, obedience is to a larger extent motivated by averting negative external consequences and avoiding punishment or scolding, whereas instrumental helping is internally-motivated (Warneken & Tomasello, 2013); and (3) *Behavior outcomes*, although the product of a completed obedient act may be intrinsically rewarding – there are typically no personal benefits inherent to an act of obedience, while instrumental helping is in and of itself rewarding to the helper (Song, Broekhuizen, & Dubas, 2020).

## Definition of Conformity

Given the large variability in perspectives on conformity in the above presented literature, as well as variability in the paradigms and operationalizations used when assessing conformity, I here define conformity as used in the current thesis and its empirical contributions. Common to studies on experimentally elicited conformity is that for a public answer to be coded as conforming there needs to be a shift in opinion in favor of the majority's opinion. Importantly, that this shift occurs does not need to be ascertained during individual trials, for example by having participants give private answers prior to hearing majority testimony, but can be inferred from what the participant *ought* to answer given their perceptual information. The rationale behind relying on inference instead of empirical assessment is that additional responses prior to being exposed to majority testimony also adds additional evaluations of the stimuli and explicitly stating an answer to the experimenter greatly mitigates ones propensity to conform (e.g., Thibaut & Strickland, 1956). Instead, using stimuli that are overall perceptually simple to discriminate for the sample and assessing that they on are able to give accurate answers by comparing rates of accurate answers between conditions (e.g., that inaccurate answers drop when confederates give accurate testimony) or by a pre-test without present confederates, can effectively maintain conformity rates in the samples. This approach is in line with the approach used in previous studies on conformity on both adults (e.g., Asch, 1956; Imhoff & Erb, 2009; Uchida, Michael, & Mori, 2020) and children (e.g., Berenda, 1950; Corriveau & Harris, 2010; Haun & Tomasello, 2011).

## Research questions and aims

The literature review above covers, to the best of my knowledge, a fair and brief condensation of historical accounts as well as today's state of both empirical and theoretical work on conformity, with a focus on children's conformity. In this review, I have highlighted that individual differences perspectives are scarce, especially so in studies on children's conformity. Given the rich knowledge available on the social and cognitive mechanisms behind conformity, I believe that a standpoint from which propensity to conform is related to other behaviors, cognitive factors, and dispositions can be a fruitful venture that further develops our understanding of this complex and fascinating behavior. The overarching aim of this dissertation was to explore the relationship between children's and their parents' dispositional characteristics and their tendencies to conform to others. This includes not only examining likelihood of conformity overall, but also separating conformist answers based on whether they were normative or informational in nature, to allow further analyses of how dispositional characteristics of children influence are linked to the motivation to conform. A further aim was to study whether being conformist is associated with being obedient or being altruistic.

# Methods

“Experiment in moral and behavior”

Entombed (2001). Chief Rebel Angel.  
*On Morning Star*. Music for Nations.

## Participants

Parents of children who had previously reported interest in participating in developmental research studies at the Uppsala Child and Baby Lab in Uppsala, Sweden were contacted via telephone. Parents were briefly informed about the aims of the study and the procedures. Interested parents were booked for participation with their child and received a gift certificate of 100 SEK (approximately 10 euros) upon participation.

Study I had a final sample of 59 children (30 girls and 29 boys), mean age 3 years, 6 months and 11 days ( $SD = 24$  days). Out of these 59 children, 54 completed all 16 trials, five completed 15 out of 16 trials, and one completed eight out of 16 trials. We additionally tested ten children that were excluded from analyses due to poor eye-tracking data (four children) or misunderstanding tasks (two children), experimenter error (two children), parents who intervened despite being told not to (two children), and parents failing to finish questionnaires (one child).

Studies II and III are based on the same dataset. This final sample consisted of 55 children, mean age 3 years, 6 months, 3 days ( $SD = 31$  days). We additionally tested four children that were excluded from analyses due to difficulties understanding the task. Some of these children intentionally misunderstood it.

Both data collections were approved by the Uppsala regional ethics committee. Parents were given both verbal and written information about the procedure, data handling, anonymity, the right to discontinue at any time, and the study's aims prior to participation and gave both verbal and written consent. Children gave verbal assent before beginning the study.

## Apparatus

The conformity tasks were completed using a Tobii T120 near infrared eye tracker (sampling rate = 60 Hz, accuracy = 0.5 degrees, monitor size = 17 inches; Tobii, Stockholm, Sweden). The eye tracker was used to register participants' gaze and was calibrated to each participant prior the experiment using a standardized 5-point calibration procedure. Participants were seated comfortably and according to the manufacturer's specifications, approximately 60 cm from the screen. The eye-tracker also served as a computer display (17" TFT, 1280 x 1024 pixels) on which the stimuli for the conformity task could be displayed. Study II is not based on eye-tracking data, however, the eye-tracker was used for stimuli presentation.

For the anonymous sharing task, we used 10 marbles in a transparent plastic bag. For the obedience task, we used a plastic cup filled with a 20 colored paper clips.

## Procedures, Material, and Stimuli

Prior to visiting the lab for participation in the experiment, parents were asked to complete web-based questionnaires about themselves as well as their participating child (described in detail below). Some parents completed their questionnaires shortly after visiting the lab but were still included in all analyses.

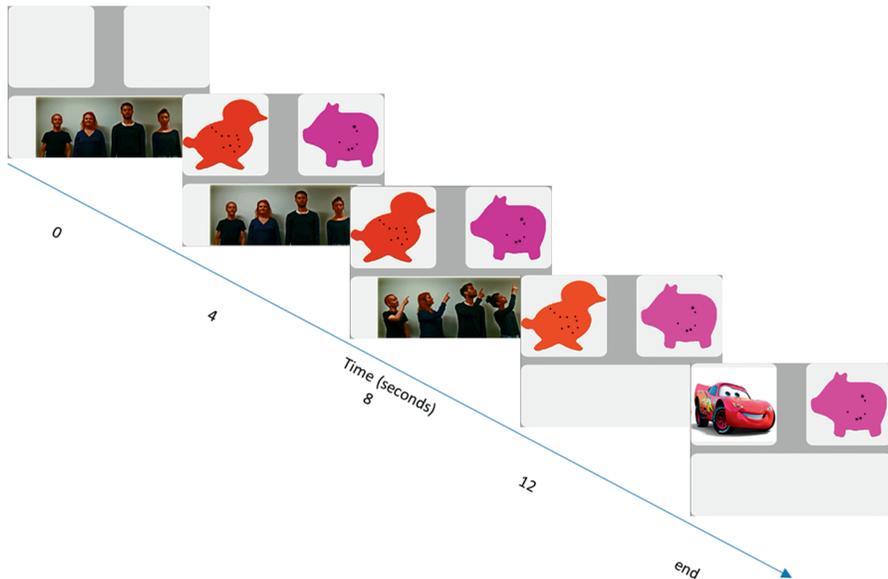
### Study I

When participants were welcomed to the lab they were told by the Experimenter that there was a need for "someone who was great with numbers", and asked if they could help the experimenter with a task. The task was to identify which animal in a pair that had the most dots printed on it. The participants were also informed that they would be assisted by adults (the confederate majority), who were co-participating on the computer. All participants enthusiastically agreed to participate. Before the start of the experiment, all participants took part in an informal warm-up phase where the Experimenter talked to the parent and the participant. Once the participant seemed comfortable in the room and with the Experimenter, the Experimenter showed two image pairs, with similar properties to those in the later experiment, printed on paper to the participant. This served several purposes: giving instructions to the participant about the task, assessing the participant's ability to understand the task and identify the correct target, and making clear to the participant that the Experimenter was not able to identify the correct target.

Once ability to discriminate the correct target was ascertained, the participant was asked to sit in front of the eye tracker so that the experiment could

start. A curtain was placed by the side of eye-tracker screen so that the participant could not see their parent, who sat in a chair 3 meters away. The curtain also hid the screen from the Experimenter and the parent – granting the participant a sense of being the only one being able to see what was displayed on the screen – while the Experimenter and participant could still see each other.

The experiment started with four smiling adult confederates displayed on screen, greeting and waving to the participant. Two confederates were female and two were male. They were only visible from the waist up and all wore dark clothing. Participants waved and greeted the confederates back.



*Figure 1.* The content of a trial in Study I, as illustrated with an incongruent trial. (A) The four adult confederates were shown at the bottom of the screen; (B) the two animals with different numbers of dots appeared in the upper corners with a click-sound; (C) the adult confederates unanimously pointed to one of the targets, in the incongruent trials as exemplified here, they pointed to the target with fewer dots (incorrect testimony); (D) the adult confederates faded out and the Experimenter asked the participant for their public answer; (E) after making some notes on a paper, the Experimenter asked the participant to look towards the correct target and a cartoon was superimposed over the correct target.

After the greeting, the first trials with dotted animal pairs were presented. All trials started with the presentation of the animal pair. The pair was visible the entire trial in the top two corners of the screen (see Figure 1). Four seconds after the animals were shown, the models unanimously pointed toward one of the targets and the video froze. Participants were instructed to pay attention to the animal pairs, but that they were not allowed to state which target they

choose until they were asked by the experimenter after the confederates had pointed. The participant was free to verbally or gesturally identify their chosen target as soon as the Experimenter asked. Their answer was noted for each trial as their public answer. Some participants pointed to the screen before the models did. The Experimenter simply did not pay attention to the participant and was looking down on a sheet of paper, calmly reminding the participant to wait until their turn. No participants or trials were excluded based on this behavior.

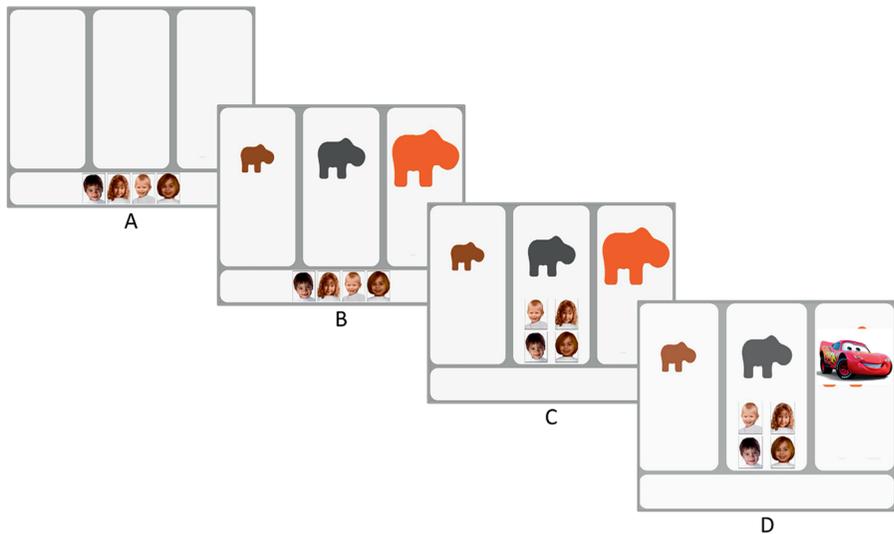
After carefully and slowly noting the participant's public answer, the Experimenter asked the participant to look towards the target with the most dots in order to see a very briefly displayed cartoon. Once the Experimenter noticed that the participant was attending to the screen, a cartoon was displayed superimposed on the correct target for 500 ms, upon a key press from the Experimenter. Different cartoons were shown in each trial. The rationale behind this was to give the participant an incentive to aim their gaze to the target which they believed was objectively correct, as the cartoon was displayed for such a short time that they would otherwise risk not seeing it. Eye-tracking data from this task was used as a measure of participants' private belief about which the correct target was in each trial.

After four familiarization trials in which the four confederates unanimously identified the correct target, 16 experimental trials followed in which the models identified the correct target on eight trials (congruent) and incorrect the remaining eight (incongruent). The incongruent trials were the trials from which we assessed measures of both public and private conformity.

## Studies II and III

This data collection differed in some aspects from that of Study I as different target stimuli were used as well as peer instead of adult models. Here, when participants were welcomed to the lab they were told by the Experimenter that they were part of a team of children the same age (peer confederate majority), who together would assist the Experimenter in identifying the largest out of three targets in a series of images. Again, all participants enthusiastically agreed to participate in this data collection. A similar warm-up phase where the Experimenter talked informally to the parent and the participant was employed here as well. During this phase, the Experimenter explained to the participant that at that very time, four other confederate children were in the same building, participating in a similar way as the participant. Moreover, the participant would be able to see the other children on a screen – and that the other participant would be able to see them. Once the participant seemed comfortable with this situation, the Experimenter proceeded to show two sets of stimuli, with identical properties to those in the later experiment, printed on paper to the participant based on the same rationale as in Study I.

An identical setup as in Study I with curtain and parents' placement was used. The experiment started with the four peer faces (two female and two male confederates) displayed on screen and greeting the participant. After the greeting, the first trials were presented. The presentation times were identical to Study I, but some other aspects differed. Specifically, the three different-sized animals were placed on the upper part of the screen and the peer confederates' faces were placed on the bottom part (see Figure 2).



*Figure 2.* The content of a trial in Study II, as illustrated with an incongruent trial. (A) The four peer confederates were shown at the bottom of the screen; (B) after two seconds, the three different-sized animals appeared with a click-sound; (C) after three seconds, the peer confederates one-by-one drifted over to one of the targets stating “this one”, in the incongruent trials as exemplified here, to the middle-sized animal (incorrect testimony); (D) the Experimenter asked the participant for their public answer and after making some notes on a paper, the participant was instructed to look towards the largest target and a cartoon was superimposed over it upon a keypress.

Four seconds after the three animal targets were shown, the pictures of the confederates each slid over to the same target while individually stating “this one”. The video then froze, and the participant was asked to declare which target they chose while facing the confederates. The Experimenter stated “all the other children chose the [color of the chosen target] [animal] – which [animal] do you think is the largest?” Upon verbal or gestural answer from the participant, the Experimenter reflected the answer to the participant “so you (also) think the [color of the chosen target] is the largest” and made a note. The Experimenter always reminded the participant that the other children would see their answer, just as the participant could see theirs. When the participant’s answer was identical to the confederates’ “Now, the other children

can see that you also chose the [chosen target]”, and when it differed “Now, the other children can see that you chose the [chosen target] instead”. As in Study I, some participants pointed to the screen before the models did and were calmly reminded to wait until their turn.

On each trial, after noting the participant’s answer, the Experimenter again reminded the participant that their answer would be seen by the other children. After carefully and slowly noting the answer on paper, the participant was asked to look towards the largest animal to see a cartoon that was to be briefly displayed for 300 ms. Similar to Study I, when the Experimenter noticed that the participant was attending to the screen, different cartoons were displayed superimposed on the correct target upon a key press from the Experimenter. The first four trials were familiarization trials in which the confederates always chose the correct target and the participant could be accustomed to the procedure. Following these trials, there were 16 experimental trials of which eight were congruent and eight incongruent.

After the conformity experiment was completed, the obedience task was carried out. The participant was first asked to get down from the chair where they had been seated in front of the eye-tracker. While the Experimenter moved some papers around, a plastic cup with paper clips was seemingly accidentally spilled over the floor. The Experimenter stated firmly to the child “you will have to pick those up, I don’t have time because I have to look at important papers with your parent”. The Experimenter then turned towards the parent and away from the child, blocking the child’s view of the parent, and quietly instructed the parent to look away from the child. The Experimenter and parent then attended papers, actively avoiding the child for one minute. Directly after this time, the Experimenter turned and faced the child, stating “I’m sorry for telling you to pick up my paper clips. I was the one who spilled them and I should have picked them up.”

Next was the anonymous sharing task. The Experimenter stated a recollection of a gift for all the participants of the study. The gift was placed in a cardboard box on the floor. The Experimenter sat down by the box together with the participant and opened it to find a plastic bag containing ten glass marbles. The Experimenter stated to the participant “These are glass marbles. You can play with them, roll them, or you can just look at them because they’re beautiful. I want you to have these”, handed over the bag to the participant stating “now they are yours”. When the participant stood up with their bag of marbles, the Experimenter directly stated “Oh no! That was really stupid of me” and asked the participant to stand next to them: “These are your marbles; I gave them to you. But I just remembered that in a few minutes there is another child, who is exactly as old as you are, who is going to participate in the same game. But those were my last marbles so I cannot give that child any marbles”. Repeating what was said, the Experimenter continued “These are your marbles and you are free to keep them all, but if you want to, you can place some of your marbles for the next child – but you don’t have to. Your

parent and I have to attend some important papers and will have our backs turned to you so no one will see or know if you share your marbles or not". The Experimenter once again turned to the parent to ostensibly attend paperwork until the participant expressed that they were done.

## Measures

Before Study I, we carried out a pilot study with thirteen participants to assess task difficulty, accuracy and reliability of the eye-tracking paradigm, as well as participant gaze behavior. Stimuli in the pilot study differed from the experimental stimuli used in Study I as there were no models on screen and therefore no incongruent conditions. From here, we could quantify mean accuracy of participants' public answers to ensure that the discrimination task was neither too easy nor too difficult, but foremost see to which extent gaze-behavior in the cartoon would predict their private belief – which here could be assumed to be the correct target if they answered correctly.

### **Public Conformity**

From the conformity tasks of both data collections, each public answer was individually noted during the experiment. The data from the eight incongruent trials was used to compute a conformity score.

In Study I, each trial's response could have two outcomes: conforming or non-conforming – the participant either chose to conform and align their answer with the adult confederates – or to answer accurately and divert from the majority testimony. Over these eight trials, we computed a conformity propensity score by dividing the number of conforming trials by 8, the number of incongruent trials. Thus, never conforming rendered a score of 0.0, while conforming on all trials rendered a score of 1.0.

In Studies II and III, each trial could have three outcomes: the participant either chose to align their answer with the peer majority (conforming), to answer accurately despite the peers (non-conforming), or choose the third target – which was both wrong and opposing of majority testimony (anti-conforming). Again, we computed a conformity propensity score by dividing the number of conforming trials by 8.

### **Normative/informational motivation distinction using eye-tracking**

The conformity motivation measure was based on incongruent trials with a conforming public response. In these trials, we focused on a time window prior to the superimposed cartoon using a preferential looking approach, comparing relative gaze time spent on each target and coding the target which received the most gaze as the selected target. In Studies I and III, the conforming trial was coded as normative if the gaze was focused on the correct target (the target that the confederates did *not* select) and as informational if the gaze was focused on the incorrect target (the target selected by the confederates).

## **Altruism**

Anonymous sharing, our measure of altruistic behavior, was coded with a score from 0-10 in accordance with the number of marbles shared. Shared marbles were those that the participant left in the cardboard box after the experiment was completed.

## **Obedience**

Obedience was coded as 1 if the paper clips spilled by the experimenter were picked up, and 0 if not. This dichotomous measure was used because no participants picked up only some of the paper clips.

## **Parents' Questionnaire measures**

In Study I, we collected parents' self-ratings of their personality using the FFM theoretical framework. There are several validated scales available, and to make sure that parents were not overwhelmed by time-consuming questionnaires, we employed a short but often used measure called the Mini-Markers (Saucier, 1994). This scale is efficient as it uses single adjectives instead of full sentence statements. That is, respondents are asked to rate, on a Likert scale ranging from 1-9 (1=Not at all; 9=Very much so), 40 adjectives that assess the five personality dimensions. For example, the dimension Openness was assessed with adjectives such as *Creative*; Conscientiousness with e.g. *Organized*; Extroversion with e.g. *Talkative*; Agreeableness with e.g. *Kind*; and Neuroticism with e.g. *Moody*.

In Study II, we assessed parents' parental style using self-ratings. Both parents (if available) of each participant responded and both of them rated themselves as well as the other parent. We used the scale Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen, & Hart, 1995) which contains 33 items tapping the three dimensions: Authoritative, Authoritarian, and Permissive. Each item is a statement which the respondent rates according to how well they believe it describes their parenting behaviors or relation with their child on a scale from 1-5, with each step corresponding to the alternatives *never*, *once in a while*, *about half of the time*, *very often*, and *always*. The Authoritative dimension has items reflecting parental warmth and expectations for the child, for example *[I help] [The other parent helps] our child to understand the impact of behavior by encouraging our child to talk about the consequences of own actions* and *[I give] [The other parent gives] comfort and understanding when our child is upset*. The authoritarian dimension contains items reflecting low parental warmth and high expectations with items such as *[I use] [The other parent uses] threats as punishment with little or no justification* and *[I scold and criticize] [The other parent scolds and criticizes] to make our child improve*. The permissive dimension has items reflecting high parental warmth and low expectations such as *[I find] [The other parent finds] it difficult to discipline our child* and *[I withhold] [The*

*other parent withholds] scolding and/or criticism even when our child acts contrary to our wishes.*

We had both parents rate each other as well as themselves for several reasons. First, it may be that parents are sometimes undiscerning or oblivious regarding to what extent they facilitate the strategies described. Moreover, there may be desirability biases to score higher or lower on some of the dimensions. Thus, having two ratings served as a control in which we could compute inter-rater reliability scores for each parent using their own rating of themselves as well as the other parent's rating of them.

### **Children's Questionnaire measures**

There are several scales that are designed specifically to assess differences in psychological characteristics between children. When it comes to measuring FFM personality traits, there is the Inventory of Children's Individual Differences, which exists in two versions – an original version with 144 items (ICID; Halverson, Havill, Deal, Baker, Victor, Pavlopoulos, Besevegis, & Wen, 2003) and a shortened version with 50 items (ICID-S; Deal, Halverson, Martin, Victor, & Baker, 2007), as well as a few others, e.g., the FFM variant Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999). However, FFM inventories are often aimed at older children or adolescents (e.g. McCrae & Costa, 2007). The benefit of using the original 144-item version ICID is that it allows for more accurate delineation of facets in the five dimensions. For example, Extroversion contains facets described as *sociability* and *activity level*. However, we presumed that the cost of the increased time to complete the inventory for the participants' parents would be greater than the potential benefits of an increased accuracy at the facet-level, mainly because the sample sizes in our studies were in any case too small to allow for reliable analyses of the effects of the facets. We therefore relied on ICID-S for assessment of children's individual differences in Studies I and III.

The ICID-S consists of statements about the children that parents rated on a five-point Likert scale, ranging from strongly disagree to strongly agree. All items began with *My child* and included statements such as *is interested in new things* (openness to experience), *does things carefully and with thought* (conscientiousness), *makes friends easily* (extroversion), *is thoughtful of others* (agreeableness), and *lacks confidence* (neuroticism).

## **Data Preparations, Pre-analyses and Analyses**

### **Public Conformity**

The public conformity responses were entered individually to allow for trial-by-trial regression analyses. We typically had data from all eight incongruent

trials per participant in which conformity could be measured. We also computed mean conformity propensity scores for each participant by dividing the number of conforming trials by eight (the total number of incongruent trials), yielding a score between 0.0 and 1.0.

### Conformity motivation

We assessed conformity motivation using preferential looking in participants' conforming trials. For Studies I and III, eye-tracking data was analyzed using the Matlab-based TimeStudio (<http://www.timestudioproject.com>; Nyström, Falck-Ytter, & Gredebäck, 2016). Analyses were based on Areas of Interest (AOIs) that were created over each potential target (two AOI's in Study I and three AOIs in Study III), and then computing the duration of gaze that was spent in each AOI during a critical time window prior to the onset of the cartoon. Trials with less than 50 percent total gaze recorded during the critical time window were excluded. Most trials had near-full gaze data while some trials for some children were tracked with less precision (see e.g., Hessels & Hooge, 2019, for comparison data on gaze data loss in infants and children) and a 50 percent cutoff fit well to exclude such trials.

### Altruism and Obedience

Scores of altruistic behavior and obedience were coded as a range from 0-10 (number of marbles shared) and 0 or 1 (whether the participant picked up the paper clips or not).

### Parental Style

The PSDQ used in Study II was computed according with the instructions of the inventory (Robinson, Mandleco, Olsen, & Hart, 1995) which outputs separate values for each of the three dimensions: Authoritative, Authoritarian, and Permissive. The values are mean scores of the items for each dimension and thus their range is from 1 to 5, in accordance with the Likert scale used.

### Personality Measures

Participants' and parents' personality measures were also computed according to the instructions of each respective inventory. We did not compute facets of any of the dimensions for participants or parents. Parents' ratings of each participant were mean-scored from both parents.

## Descriptive and Preliminary Statistical Analyses

The aim of pilot test run prior to Study I was to ascertain the reliability of 3.5-year-olds answering accuracy when they ostensibly know which target is correct and to obtain reference data on gaze-behavior when the participant's public and private answers had no reason to be different. We described the ratio of participants who answered correctly on all trials, as well as providing descriptive data of gaze behavior in the subsequent cartoon part of each trial to ascertain and report accuracy of gaze data to infer participants' private beliefs. We reasoned that given no social information (there were no models in any trials of the pre-test), gaze data would match the public answer given and both could serve as baselines against which conformity could later be compared.

To validate the data before analyses, we conducted both descriptive statistical analyses and rudimentary inferential statistical tests in all studies. For questionnaire data, we computed and reported means, dispersions (standard deviations from the mean), consistencies (inter-item reliabilities using Cronbach's alpha), intra-individual correlations between FFM dimensions, inter-individual correlations between parents' and their children's FFM dimensions, and inter-rater reliabilities of parents' ratings of their child.

For public conformity measures, we computed mean proportions of chosen targets over conditions. Specifically, we confirmed that *correct* overall participant answering would decrease between the congruent and incongruent conditions, using dependent *t*-tests.

## Inferential Statistical Analyses

We conducted several preliminary analyses across the Studies. Firstly, we presented correlations across behavioral and individual differences variables (Studies I, II, and III). These correlations served both as a description of how the variables potentially covariate, but also as a means to determine which variables to include in further regression analyses. Secondly, we ascertained that the models' testimony had effects on participants leading to group level conformity (Studies I and II). We did this by comparing the rates of correct answers in the congruent condition with incongruent conditions using a regression model (Study I) or a *t*-test (Study II). Having significantly higher rates of correct answers in the congruent than the incongruent condition indicates that the incongruent condition contains conformist answers.

In Study I, our first main analyses examined whether parents' or participants' personality traits predicted propensity to conform, i.e., the mean conformity score of each individual participant. We first conducted two analyses in which we split the participants into two groups: high- and low conformists. One using a median split (conforming on 6 or more out of the eight trials) and one using a 50% percent split (conforming on 5 or more out of the eight trials).

By splitting the participants into two groups we could tentatively analyze effects from personality traits. We then employed a binomial logistic regression models to examine whether participants' or their parents' personality traits would predict participants' propensity to publicly conform (model 1) and whether the conforming took place with a normative or informational motivation (model 2). Specifically, in model 1, which included all incongruent trials, the public answer of each trial (0 = non-conformist; 1 = conformist) was the dependent variable, participant was included as a random effect, and participants' and parents' personality traits on the five dimensions were fixed factors. In model 2, which included only conforming trials, was identical to model 1 except that we changed the dependent variable to the binary variable of private belief – whether the participants' preferential looking indicated normative or informational motivation.

In Study II, focusing on parental style and public conformity, we employed an ordinal regression model with public conformity as dependent variable and parental style dimensions as predictors. We additionally added our measures of obedience and anonymous sharing as predictors in the model to see if they would contribute to explaining variance in conformity.

In Study III, we employed a multinomial generalized logit mixed-effects model with participants' preferential looking in conforming trials as dependent variable, participant as random factor, and mean scores of both parents' ratings of the participant's personality traits as fixed factors. Our aim was to see if participants' personality traits could be predictive of their motivation to conform, as assessed with preferential looking.

# Empirical Contributions

## Study I

### Background and aims

In this study, we had several research questions that we aimed to answer: Are we able to replicate the Asch paradigm in 3.5-year-old preschool children using virtual adult confederates displayed on a screen, and if so, can we measure each conforming answer's motivation on a trial level? Given that we were able to both induce conformity in the sample and assess the motivation behind it – could we use participants' and their parents' individual personality characteristics to predict who conformed more often and for what reason they did so?

Because the literature on dispositional influences on conformity was scarce at the time this study was planned and executed, the nature of this work was exploratory. Previous work had investigated self-rated conformity and related it to higher-order combinations of FFM dimensions (DeYoung, Peterson, & Higgins, 2002), suggesting that self-rated conformity correlated negatively with plasticity (extroversion and openness to experience) and correlated positively with stability (agreeableness, conscientiousness, and emotional stability [reversed neuroticism]). Importantly, the self-rated conformity in this study was not operationalized from behavior in experimental or observational setting, but a latent variable derived from two questionnaire scales measuring impression management and response biases (Paulhus, 1991; Eysenck, Eysenck, & Barrett, 1985), using structural equation modelling. Therefore, there is a fundamental conceptual difference between this measure of latent conformity and the experimentally elicited variety of conformity using Asch-style paradigms: Namely that conformity is conceptualized in the current studies as a behavioral or cognitive alignment with majority testimony, it is a phenomenon that cannot be reliably self-assessed using questionnaires nor is it phenomenon or trait that participants themselves necessarily are aware of. However, one later study did lend support to the link between stability, as defined by DeYoung and colleagues (2002), and conformity using experimentally elicited conformity (Kosloff, Irish, Perreault, Anderson, & Nottbohm, 2017).

Just as in adults, children's aligning of their behavior to majority consensus is an inherently social behavior. Children imitate others at costs to their procedural efficiency (e.g., Haun, Rekers, & Tomasello, 2012) and even imitate antisocial behavior (e.g., Engelmann, Herrmann, Rapp, & Tomasello, 2016).

However, whether children internalize the others' behaviors in these paradigms or merely change their outward behaviors is less clear. A prerequisite to investigating individual differences in children's motivations to conform is that they are able to conform for both normative and informational reasons at the group level. That is, do young children have the cognitive capacity to form an independent opinion before witnessing a majority of others communicate a differing opinion – thereafter strategically express the latter while not accepting it over the former, perceptually or individually acquired opinion. At the time, studies had demonstrated normative conforming when children were asked again by an Experimenter after a conforming trial which target was correct, and they could indicate the correct target privately (as opposed to an incorrect, conformist, target; Corriveau & Harris, 2010; Haun & Tomasello, 2011; McGuigan & Robertson, 2015). Studies also suggest children conform for informational reasons, or internalize the majority testimony as true, to some extent in the above reports as well as in others (e.g., Schillaci & Kelemen, 2014).

Studies on children's personality indicated that personality is, even in young children, a relatively robust measure of individual differences (e.g., McAdams & Olson, 2010) which has predictive value for later social behavior (Zupančič & Kavčič, 2005). Studies also indicated a high validity of FFM compared to temperament frameworks in young children when assessing young children's dispositional characteristics (e.g., Grist & McCord, 2010) and that parental ratings of children's personality showed consistency both over time and across parents (Zupančič, Sočan, & Kavčič, 2009). We saw advantages of using FFM over temperamental inventories as FFM is the *modus operandi* in adolescent and adult studies on individual differences and it would be favorable to use a framework for which potential results could be more effectively translated to other age groups. Moreover, we also collected self-rated personality of the children's parents. We did this to assess whether differences in parental personality could also be predictive of differences in children's conformity.

## Results

Data from the pilot study showed that 10 out of the 13 3.5-year-old participants correctly identified all targets in eight trials that did not depict confederates or thus any majority opinions. One participant answered incorrectly on one trial, one participant answered incorrectly on four trials, and one participant answer incorrectly on all trials. Regarding the preferential looking measure of the time window before the cartoon was displayed superimposed on the correct target, these data show that participants looked toward the correct target on 88% of trials overall, 90% counting only the 93 trials in which a correct public answer was given. In the remaining 13 trials with incorrect public answering, only 8 had subsequent looking to the correct target, a number largely

explained by the participant who publicly answered incorrectly on all trials. Taken together, these tentative data suggest that our paradigm, on a group level, reliably reflects participants' abilities to discriminate the correct target and that preferential looking as used in this setup reliably taps their private belief. There were no effects of participant gender or age on any of the other variables and these were excluded from further analyses.

Confederates' testimony had effects on children's public answering as computed by comparing the number of correct answers in the congruent condition ( $n=464$ ; 70.7 %) versus the incongruent condition ( $n=465$ ; 40.4 %) using Fisher's exact test  $p < .001\%$  and a mixed-effect binomial logistic regression model ( $\beta=-1.27$ ,  $SE=0.14$ ,  $z=-8.76$ ,  $p<.001$ ).

To analyze the effects of personality on likelihood of conforming, model 1 used all incongruent trials and had participants' public answer (conforming or non-conforming) as a binomial dependent variable and participant as a random factor. This model showed no significant contributions of participants' personality traits. These were therefore trimmed from the final model which included only parents' personality traits as fixed factors. Parental extroversion contributed significantly to the model ( $\beta = -0.35$ ,  $p = .02$ ), indicating that parents who were self-rated as lower on extroversion had children who conformed more often.

Table 1. *Model 1 of Study I, a mixed-effect binomial logistic regression model with parental FFM personality dimensions as fixed factors on participants' public answering (1=correct/non-conforming; 0=incorrect/conforming).*

		<i>B</i>	Std. Err.	<i>z</i>	<i>p</i>
Parental FFM	Intercept	4.03	2.66	1.52	.12
	Openness	0.25	0.20	1.27	.20
	Conscientiousness	0.39	0.20	1.94	.05†
	Extroversion	-0.35	0.15	-2.28	.02*
	Agreeableness	0.14	0.33	0.44	.66
	Neuroticism	0.21	0.18	1.16	.24

For analyses on conformity motivation, we obtained a total of 227 conforming trials from the incongruent condition. Of these trials, a subtotal of 115 had informational and 112 had normative motivations, according to the gaze data on private looking. Model 2 used all conforming trials and had participants' conformity motivation as a binomial dependent variable (i.e., looking to the correct target was coded as normative, and incorrect target informational) and participant as a random factor.

Initial modelling showed no significant effects of parents' personality and they were therefore excluded. The final model showed that participants' low openness ( $\beta = -.58$ ,  $p = .04$ ) and high extroversion ( $\beta = .77$ ,  $p = .01$ ) predicted conforming with a normative motivation.

Table 2. *Model 2 of Study 1, a mixed-effect binomial logistic regression model with participant FFM personality dimensions as fixed factors on participants' conformity motivation (1=normative; 0=informational).*

		<i>B</i>	Std. Err.	<i>z</i>	<i>p</i>
Participant FFM	Intercept	-0.86	2.39	-0.36	.82
	Openness	-0.58	0.28	-2.04	.04*
	Conscientiousness	0.00	0.30	0.00	1.00
	Extroversion	0.77	0.31	2.45	.01*
	Agreeableness	-0.20	0.29	-0.69	.49
	Neuroticism	0.18	0.20	0.93	.36

## Conclusions

In this study, we provide data which suggest that personality traits of both preschoolers and their parents, are associated with preschoolers' social behavior and belief change in an Asch-style conformity paradigm. Being the first of its kind, this work had a clear explorative approach in which we had no explicitly stated *á priori* hypotheses regarding which traits in children or in their parents that could potentially influence their propensity to conform or their motivation for doing so.

Specifically, we show that children whose parents rated themselves as being less extroverted, showed higher rates of public conformity, as measured by how often they publicly answered incorrectly in line with the adult confederates. We found no effects of children's personality on this measure, suggesting personality may not predict propensity to conform to adult majorities for preschool-aged children. A tentative explanation for this result is that the propensity to conform publicly is not contingent on dispositional characteristics as assessed in the current study, but rather contingent on parental characteristics – which make up an environmental domain for children. For example, children of less extroverted parents may be less often exposed to social interactions, especially with other adults. Such a difference in richness in the social worlds between children of high and low extroversion parents may contribute to effects of trust in, or processing of social information from, unknown adults.

We also show that, when a child does conform, their personality traits predict the motivation behind that behavior. That is, children's personality traits do not influence the overall propensity to conform, but rather which of the two motivations that was used when they did conform: highly extroverted, as well as children with low openness scores, conformed more for normative motivations. Or to put it another way, informational motivations to conform were more likely among children who were low on extroversion or high on openness.

Given that children's extroversion did not predict overall conformity propensity, this finding for normative conformity may suggest that extroverted children are to a larger extent capable of strategically using social information

without accepting it as true and thereby not internalizing it as private belief. In contrast, children rated high on openness show an increased tendency, or willingness, to trust testimonials of others, in this case adults.

## Study II

### Background and aims

Building off of one of the findings in Study I, namely that parental personality characteristics were predictive of children's propensity to conform, the aim of Study II was to see if we could find similar effects using parenting styles. Our hypothesis was that authoritarian child-rearing strategies would predict conformity based on the more theoretical assumptions that authoritarian parenting promotes conformist behavior (Berger, 2014) or that authoritarian attitudes and valuing social conformity are intertwined (Feldman, 2003), the latter of which has received empirical support (Passini, 2017). Moreover, we wanted to address whether other social behaviors were related to conformity. Specifically, we wanted to investigate whether altruistic behavior and obedience, two social behaviors that are conceptually related to conformity, were correlated in preschoolers. Such evidence would be of both theoretical and conceptual interest because it could potentially suggest shared underlying mechanisms or motivations.

We chose to focus on child rearing strategies using the framework developed by Baumrind (1968; 1971) who proposed the three discrete parenting styles: Authoritative, Authoritarian, and Permissive. The authoritative style encapsulates being supportive and responsive to the child's needs while also placing demands on the child's behavior. The authoritarian style, on the other hand, does not emphasize supportiveness and responsiveness, but still places demands on the child's behavior. The permissive style primarily describes a lack of demands for the child. We quantified these dimensions in the parents of the participants using the Parental Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen, & Hart, 1995), an often-used inventory with adequate reliability and validity despite cultural differences (Olivari, Tagliabue, & Confalonieri, 2013). Given the theoretical arguments for the influence of the authoritarian parenting on conformity we were mainly interested in this dimension (Berger, 2014; Passini, 2017). Authoritarian parenting has been linked to various social behaviors, including externalizing behavior (Pinquart, 2017), aggressiveness (Muñoz et al, 2017), and social competence (Gagnon et al, 2014). Children whose parents report higher levels of authoritarianism, or right-wing authoritarianism, place more trust in adults who adhere to conventions (Reifen Tagar, Federico, Lyons, Ludeke, & Koenig, 2014) and conform to a larger extent (Guidetti, Carraro, & Castelli, 2017). Because

we demonstrate that children whose parents rate themselves as being less extroverted conformed more to adults' testimony in Study I, we had indications that parents' personality traits influenced children's conformity. Here, we were interested to see whether such influence also could be explained by child rearing style, given connections between parental personality and parental style (Browne, Meunier, O'Connor, & Jenkins, 2012; Coplan, Reichel, & Rowan, 2009).

Additionally, whether high-conforming children differ from low-conforming children in other social behaviors is an unexplored avenue of research. Firstly, are high-conforming children more generous to (unknown) peers? We reasoned that if children's conformity would be partially grounded in social interest or affiliative motivations this would also be reflected in prosocial behaviors. Altruistic behavior and preferences for fairness are extant already in late infancy (e.g., Geraci & Surian, 2011; Hepach & Warneken, 2018; Schuhmacher, Collard, & Kärtner, 2017) and are likely grounded in the ability to empathize with others (Liu, Huang, Xu, Jin, Chen, Li, Wang, Song, & Jing, 2016; Sally & Hill, 2006). The ability to identify moral norms and attribute negative emotional effects when these are transgressed is also linked with altruistic behaviors (Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010), suggesting a tentative link between not only social competence factors and complex empathic reasoning to altruistic behavior. Secondly, if conformity is contingent or motivated by some latent system, overarching compliance and obedience is not explored. This reasoning is grounded in obedience and normative conformity ostensibly sharing common social motivations – to align one's behavior with that of others to ally or ingratiate – to avoid punishment (obedience) or to affiliate (conformity). To investigate a potential relationship between conformity, altruism, and obedience we included experimental tasks to assess these latter two behaviors: an anonymous sharing task where the participant was invited to donate their own resources to a fictive unfortunate peer, and an obedience task where the participant was firmly instructed to pick up spilled paper clips for the Experimenter.

## Results

Preliminary analyses demonstrated that participants answered incorrectly less often in the congruent condition ( $M = 12.2\%$ ;  $SD = 18.4\%$ ; 95%  $CI[7.5\%$  to  $17\%]$ ) than in the incongruent condition ( $M = 25.7\%$ ;  $SD = 32.9\%$ ; 95%  $CI[17.2\%$ ;  $34.1\%]$ ),  $t(54) = -2.46$ ,  $d = 1.16$ ,  $p = .017$ , which indicates that participants were influenced by the peers' testimony. However, note that we observed fewer conforming trials in this study compared with Study I (grand total of 20 percent conformity versus 48 percent in Study I), and only 29 out of the 55 participants conformed on at least one trial.

Authoritarian and permissive parental style dimensions showed fair to moderate interrater reliabilities and both fathers' and mothers' ratings of themselves as well as the other parents rating of them were aggregated into mean scores for each parent. The authoritative dimension's inter-rater reliability was poor, and because we had no hypothesis regarding this dimension we excluded it from further analyses.

The anonymous sharing task resulted in reasonable variability over participants. Seventy-two percent did not donate any marbles, 20% donated 1-5 marbles, and 7% donated all of their marbles. We thus coded altruistic behavior as an ordinal variable reflecting the amount of marbles donated. The obedience task was slightly affected by a ceiling effect as 87% of participants picked up all the spilled paper clips and the remaining 13% picked up none. We therefore coded obedience as a binary variable.

Further preliminary analyses were conducted to check for gender effects. We conducted a series of two-sided independent *t*-tests to investigate whether there were mean differences between boys and girls on the variables of interest, none of which were significant (conformity  $p=.64$ ; anonymous sharing  $p=.21$ ; father authoritarian  $p=.82$ ; mother authoritarian  $p=.97$ ; father permissive  $p=.35$ ; mother permissive  $p=.84$ ; nor differences in obedience,  $OR=.96$ ,  $p=1.00$ , Fisher's exact test). The lack of gender effects is in line with many other studies on conformity (e.g, Engelmann, Herrmann, Rapp, & Tomasello, 2016; Kim, Chen, Smetana, & Greenberger, 2016) and we thus excluded gender from further analyses.

We conducted a linear regression model to see whether parental style dimensions were predictive of conformity. Moreover, we included our measures of obedience and altruistic behavior. In this model, both fathers' authoritarian style and altruistic sharing predict conformity ( $F(6, 41)= 3.61$ ,  $p < .01$ , adjusted  $R^2 = .25$ ; see Table 3). We replicated this regression using mothers' and fathers' ratings of themselves and the other parent separately, both of which yielded comparable results.

Table 3. *A linear regression model with conformity (0-1) as dependent variable, and parental ratings of own and other parent's authoritarian and permissive parental styles, and measures of children's obedience and anonymous sharing as predictors. b represents unstandardized regression weights.*

	$\beta$	Std. err.	<i>t</i>	<i>p</i>
Intercept	-0.89	0.34	-2.62	.01
Maternal Authoritarian style	-0.31	0.19	-1.66	.10
Paternal Authoritarian style	0.82	0.22	3.72	<.001
Maternal Permissive style	-0.21	0.18	-1.15	.26
Paternal Permissive style	0.37	0.19	1.89	.07
Obedience	-0.01	0.11	-0.11	.91
Anonymous sharing	0.04	0.02	2.44	.02

This demonstrates that fathers', but not mothers', authoritarian style influences children's conformity in our data. It also shows a linkage between conformity and anonymous sharing, our measure of altruistic behavior, but not with obedience. In turn, a rank correlation between anonymous sharing and obedience was not significant ( $r_s = .24, p = .09$ ) indicating that anonymous sharing and obedience are not significantly associated. We further examined whether the parental style dimensions were predictive of anonymous sharing or obedience, but both models were non-significant,  $\chi^2(4) = 9.30; p > .05$ , and  $\chi^2(4) = 0.61; p = .96$ , respectively.

## Conclusions

Study II shows evidence supporting that parenting influences children's conformist behavior. Specifically, fathers' authoritarian style, as reported by both fathers themselves, mothers' ratings of the fathers, and the mean score used in the final analysis of this study. Moreover, conformist behavior was correlated with altruistic behavior as assessed through an anonymous sharing task, but not with obedience as assessed through the behavioral response to the Experimenter's explicit instructions to pick up spilled paper clips.

That authoritarian parental style would influence children's conformity rate is in line with several theoretical frameworks. For example, different conceptualizations of authoritarianism (e.g., RWA) are linked or intertwined enforcing or valuing social conformity (Feldman, 2003) and that valuing conformity and obedience over freedom and difference is inherent to authoritarianism (Stenner, 2009). Authoritarian persons also tend to employ authoritarian parenting (Manuel, 2006) which has influences over children's trust in unconventional adults (Reifen Tagar, Federico, Lyons, Ludeke, & Koenig, 2014). Our effect of parental gender suggests that fathers', but not mothers', authoritarian parental style influences this propensity, which appears to be opposite to the effect reported by Guidetti, Carraro, and Castelli (2017). However, they did not measure authoritarian parental style, but rather used a 4-item forced-choice inventory incorporating preference for authoritarian versus non-authoritarian statements (e.g., "independence versus respect for elders"; and "obedience versus self-reliance"), thus tapping the construct of authoritarianism differently than in the current study. Importantly, and what should be highlighted from Guidetti, Carraro and Castelli's (2017) study is that they demonstrate a link between parents' social conservatism and children's distrust in unconventional adults – which they additionally speculate is a foreshadowing of adult authoritarians' greater reliance on heuristic processing (p. 890) because of their bias to reject information based on the model's adherence to norms.

The current study fits well with the above literature, and expands our understanding of how parental style affects children's social behavior – and even cognition. We argue that the effect of fathers' authoritarian style in the current study likely stems from lower responsiveness to the child and less willingness

to let the child democratically participate in the family (Baumrind, 1968; Berger, 2014). Authoritarian parents also more often disregard their children by answering “because I told you so” and “how many times do I have to tell you” (Robinson, Mandelco, Olsen, & Hart, 1995) thereby being less responsive to the children’s inquiries or behaviors. We believe that one of the effects that springs from such interactions is that children become less inquisitive and, importantly, less willing to deviate from norms – thus more easily heeding the majority opinion and conforming.

Anonymous sharing, reflecting altruistic behavior, was also predictive of conformity in our model, separately from authoritarian parental style. We offer two plausible explanations for this association, both of which are testable. First, a recent study linked anonymous sharing with honesty-humility (Allgaier, Ścigala, Trautwein, Hilbig, & Zettler, 2020), a personality trait in the HEXACO-model of personality reflecting sincerity, greed avoidance, modesty, and fairness (Ashton & Lee, 2007). A tentative link between conformity from this point of view is that altruism is most likely linked to the greed avoidance and fairness facets of the honesty-humility dimensions, whereas conformity could be linked to the modesty facet. Children with high modesty scores would presumably be less inclined to deviate from a unanimous majority as modesty is conceptualized as not seeing oneself as better or different than others (Ashton, Lee, & De Vries, 2014). Second, conformity and anonymous sharing may reflect participants’ aims of social cohesion: avoiding the risk of personally being excluded or ostracized (conformity) or that second- or third-party individuals would be (anonymous sharing).

## Study III

### Background and aims

In this study we investigated whether FFM personality traits predict 3.5-year-olds’ propensity to conform to peer confederates. Additionally, we aimed to replicate and nuance the findings of conformity motivation from Study I, using peer instead of adult confederates. Using the same preferential looking time approach as described in Study I, we gave the participants an incentive in each trial to look towards the target they believed was correct after giving a public answer in order to tap what their private was.

Three-year-olds are prone to trust unanimous majorities (Jaswal, Croft, Setia, & Cole, 2010; Koenig & Harris, 2005; Ma & Ganea, 2010). Around this age, they are also able to form the notion of norms (Schmidt, Butler, Heinz, & Tomasello, 2016) which they tend to see as prescriptive rather than normative (Roberts & Horii, 2019). That is, around three and four years of age, children are very sensitive to a majority consensus and even impose norms on deviating others (Schmidt, Rakoczy, Mietzsch, & Tomasello, 2016) and portray such

individuals more negatively than older children do (Roberts, Gelman, & Ho, 2017). However, that three- and four-year-olds are biased to believing a majority consensus and see their testimony or behavior as normative and prescriptive, does not necessarily imply that they always internalize the testimony privately. Children can strategically align an observable behavior with the behavior or expectations of others, for affiliative reasons or peer pressure (Haun & Tomasello, 2011), strategic reasons (Kenward, Hellmer, Winter & Eriksson, 2015), or reputation management (Botto & Rochat, 2019). These findings demonstrate the ability to behave or entertain a thought that is not identical to what you would want to do, or believe – despite not accepting it as right. Moreover, by the age of four, children are able to assess the reliability of a consensus, placing less trust in unanimous testimony that is based on one individual’s guessing rather than all individuals’ independent observations (Kim & Spelke, 2020). Children at this age are thus not blindly accepting majority information as true (Pham & Buchsbaum, 2020).

Importantly, the above reports of children’s ability to assess reliability of majority consensus and behave differently than what they believe, each include variability in children’s responses. That is, three- and four-year-olds are both heterogeneous groups in which several abilities and strategies are represented. Taken together, this also indicates that some children strategically display behavior that is not in line with their private cognition, perhaps because they are more sensitive to social factors of majority testimony, while other children are more prone to take on not only the behavior of a majority, but to believe in it as well. We thus assume that the overt changing of belief to align with the majority may be driven by different motivations. Here, we distinguish conformity motivation by coding private belief during conforming trials and use FFM personality traits to see whether scores differ between these motivations.

## Results

Analyses of conformity propensity were done on incongruent trials, including all participants. Fathers’ and mothers’ ratings of participant FFM personality dimensions correlated moderately and showed good inter-rater reliability and were mean scored. Initial correlation analyses indicated no support for the hypothesized linear relationships between participants’ or parents’ FFM dimensions and conformity propensity. We did see, however, that mothers’ conscientiousness correlated with conformity propensity ( $r = .37, p < .01; r^2 = .14$ ). We therefore followed up the analysis of parental personality dimensions as planned with a generalized mixed-effects model predicting participants’ conformity propensity using parents’ personality. We found no hypothesized effects of mothers’ or fathers’ extroversion, however, mothers’ Conscientiousness ( $B = 2.50, SE = 0.81, z = 3.10, p < .01$ ) and fathers’ Openness ( $B = -$

1.66,  $SE = 0.69$ ,  $z = -2.41$ ,  $p < .05$ ) contributed significantly to the model. Because of findings in Study I revealing that high extroversion was predictive of normative and low extroversion was predictive of informational conformity motivation, we considered the possibility that the effect of Extroversion on conformity may be non-linear. Further, a visual inspection of raw data indicated a possible U-shaped relationship between personality and conformity. FFM personality dimensions were therefore added as quadratic predictors to the model examining children's personality and conformity propensity.

Table 4. *A binomial generalized logit mixed-effects model with participants' conformity as dependent variable (conform/non-conform), parents' ratings of participants' extroversion (mean scored) and extroversion squared as fixed factors, and participant as a random factor.*

	<i>B</i>	Std. Error	<i>z</i>	<i>p</i>
Intercept	-3.09	0.75	-4.15	<.001
Extroversion	1.29	1.23	1.05	0.24
Extroversion <sup>2</sup>	5.24	2.31	2.27	0.02

The final model shown in Table 4, from which all non-significant dimensions were trimmed indicate a U-shaped relationship between extroversion and conformity shown in Figure 3.

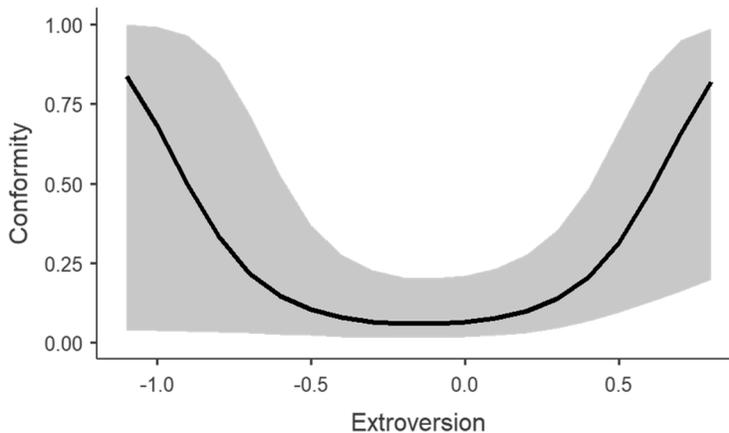
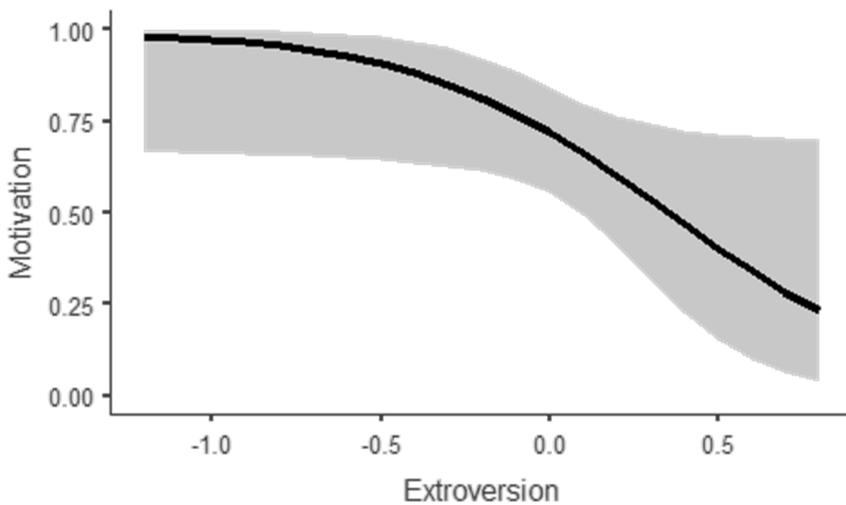


Figure 3. The relationship extroversion and conformity to peers in Study III. Both high and low scores on extroversion were predictive of greater propensity for public conformity.

For further analyses on conformity motivation, we obtained a total of 90 trials from 27 participants whereof 60 trials were coded as having an informational motivation, 24 as having a normative motivation, and six as having an unclear motivation (visual preference for the smallest target which was neither correct, nor selected by the peers). A multinomial generalized logit mixed-effects

model with participants' conformity motivation as dependent variable, participant as random factor, and mean scores of FFM personality as fixed factors was used to investigate FFM dimensions' potential effect on conformity motivation. Given the uneven distribution of trials across participants, we used robust covariance estimations and varied the degrees of freedom across tests using Satterthwaite approximation. In this model, shown in Figure 4, participant extroversion was the only significant predictor of children's conformity motivation and was associated with increased normative motivation (i.e., looking time towards the correct target;  $B = -2.67$ ,  $SE = 1.35$ ,  $t = -1.97$ ,  $p < .05$ ). Similar results were obtained using mothers' and fathers' ratings individually. We thus failed to replicate the effect of openness observed in Study I using adult confederates.



*Figure 4.* The relationship between extroversion and conformity motivation in Study III with normative motivation coded as 0 and informational motivation coded as 1. Children low on extroversion conform more often with an informational motivation while children higher on extroversion conform for normative and informational motivations.

## Conclusions

The current study shows that extroversion is related to 3.5-year-olds' propensity as well as motivation to conform to unanimous peer majorities. In our data, the most and least extroverted participants were overall most prone to conform. Importantly, this effect also reflects that the variability in conformity propensity was larger at the ends of the extroversion spectrum. In addition, children high on extroversion tended to conform for both normative and informational reasons, while children low on extroversion tended to only conform for informational reasons, which also replicates our findings reported in

Study I using adult confederates. In Study I, we observed that children who were rated high on openness conformed more often for informational reasons and children who were rated low on openness more often conformed for normative reasons. This effect was not observed in the current dataset using peer confederates. Whether the effect of openness on conformity motivation is tied to confederate or informant age, or if it is a weaker effect that failed to emerge is subject to further inquiry.

We did not find support for parental Extroversion being associated with conformity propensity, as hypothesized from findings in Study I. We did, however, see significant effects of mothers' Conscientiousness and fathers' Openness. Given that these findings are exploratory and lacking support in the previous literature, we refrain from elaborating on potential explanations, and instead highlight that the influence of parental characteristics and behaviors on children's behaviors are complex and potentially context-specific.

Importantly, our paradigm allowed us to assess what the participant privately accepts as being the correct answer, which not only allows us to infer what the participant motivation to conform was, but also what the participant holds as true. This distinction is important because it has an epistemic significance, too. That is, when they give a conforming response publicly, more extroverted children are more likely to continue to hold their initial (objectively accurate) opinion as true, thus more able to conform strategically as a means of affiliation, while less extroverted children more often seem to internalize the majority testimony to be accurate.

## Addendum Analyses

### Rationale

The effect of extroversion onto conformity motivation was similar across Studies I and III, that is, high extroversion predicted greater likelihood of normative conformity to adult (Study I) and peer majorities (Study III), yet Study I failed to show an effect of child extroversion on overall propensity to conform. However, it is possible that the quadratic effect seen in Study III may also be present in Study I. By pooling the data from Study I and Study III, adding confederate age as a fixed factor (i.e., Study I vs. III) and an interaction between confederate age and extroversion, I could investigate both if extroversion squared is predictive of conformity to adult confederates as to peers, but also if this effect is exerted similarly across confederate ages.

Additionally, using data from Studies II and III (which derive from the same dataset), I wanted to see whether the effect of fathers' authoritarian parenting style and the effect of participants' squared extroversion shared any explained variance in conformity propensity or if they uniquely explained different parts of this variability.

## Results

To test whether extroversion squared would predict conformity propensity in Study I, I conducted an identical model as presented in Table 4 for Study III, using conformity as binomial dependent variable, participant as random factor, and extroversion and extroversion squared as predictors. To this model I added the corresponding data from Study I as well as confederate age (Study ID) as a fixed factor and its interaction with extroversion squared. Because extroversion was rated on a scale ranging from 1 to 5 in Study I and 1 to 7 in Study III, and to avoid any other systematic mean differences, the extroversion scores were *z*-scored within their respective data sets prior to pooling.

The model (Table 5) showed that extroversion squared significantly predicts conformity propensity to both adult and peer confederates. Importantly, that the interaction between confederate age and extroversion squared does not contribute to the model suggests that the effect extroversion squared has on conformity propensity is similar across the two confederate age groups (see Figure 4).

Table 5. *A binomial generalized logit mixed-effects model with participants' conformity as dependent variable (conform/non-conform); binomial confederate age (Study I or Study III coded as Peer or Adult), parents' ratings of participants' mean-scored extroversion and extroversion squared as fixed factor; the interaction between confederate age and extroversion squared; and participant as a random factor.*

	$\beta$	Std. Err.	<i>z</i>	<i>p</i>
Intercept	-1.13	0.31	-3.62	<.001
Confederate age	-2.55	0.63	-4.03	<.001
Extroversion	0.23	0.23	1.00	.31
Extroversion <sup>2</sup>	0.54	0.20	2.71	<.01
Confederate age * Extroversion <sup>2</sup>	0.24	0.39	0.60	0.55

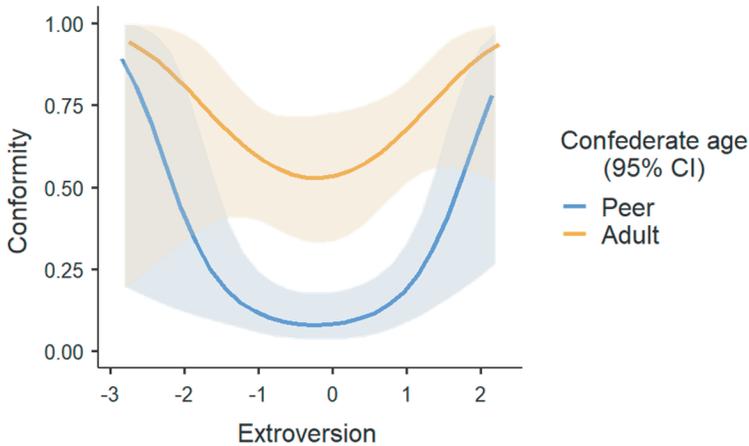


Figure 5. The effect of extroversion squared on conformity across Studies I (Adult) and III (Peer).

The second model was to test whether extroversion squared as reported in Study III and parental effects as reported in Study II contributed independently to this data set. The model is identical to the model presented in Table 4, but with added fathers' self-rated authoritarian parental style as a predictor.

Table 6. *A binomial generalized logit mixed-effects model with participants' conformity as dependent variable (conform/non-conform), parents' ratings of participants' extroversion (mean scored) and fathers' self-rated authoritarian style as fixed factors, and participant as a random factor.*

	<i>B</i>	Std. Err.	<i>z</i>	<i>p</i>
Intercept	-2.36	0.58	-4.07	<.001
Extroversion	1.70	1.04	1.64	.10
Extroversion <sup>2</sup>	3.71	1.88	1.98	<.05
Fathers' Authoritarian Parental style	5.66	1.72	3.29	<.01

This model indicates that fathers' authoritarian parental style and participant extroversion each explain unique variance in public conformity.

## Conclusions

These addendum analyses were conducted to further investigate and explain the effects of extroversion across studies with different-aged confederates and to rule out that the effects of parental style and participant personality were confounded.

The first analysis indicated that the effect of 3.5-year-olds' extroversion, with the lower and higher ends of extroversion being more predictive of public

conformity than average extroversion, holds for both peer and adult confederates. Although we speculated in the manuscripts that children's conformity to peers and adults may be qualitatively different, this finding suggests that there is a similarity in the effect of extroversion. This finding suggesting a non-linear relationship between personality and conformity might also give insight into the seemingly conflicting findings of conformity's U-shaped relation to IQ (Muthukrishna, Morgan, & Henrich, 2016).

The second analysis show that fathers' authoritarian parental style and participant extroversion each explain unique variance in public conformity. The fact that these findings are reported in separate manuscripts motivated me to show that they are separate effects.

# General Discussion

“Don’t conform”

The Varukers (1983). *Don’t Conform.*  
*On Bloodsuckers.* Riot City Records.

“Conform!”

Otep (2004). *Warhead.*  
*On House of Secrets.* Capitol.

This thesis presents three empirical studies with a general focus on 3.5-year-olds’ conformity to majority testimony. Specifically, the aims were to see if individual differences and psychosocial factors were predictive of a general propensity to conform (Studies I, II, and III) or the motivation behind the conformity (Studies I and III), and if the propensity to conform was correlated with anonymous sharing behavior or obedience (Study II).

The bulk of scientific inquiries regarding conformity in both adults and children have been focused on assessing prevalence rates within or across samples, for example by varying the level of consensus (Morgan, Laland, & Harris, 2015), ethnic background (McDonald & Ma, 2016), or age (McGuigan & Stevenson, 2016) of the majority, or by comparing conformity rates across participant ages (Flynn, Turner, & Giraldeau, 2018; Misch & Dunham, 2021). Such findings have led to an understanding of conformity as a complex phenomenon that develops over the lifespan, and have let us infer rich theories about social learning (e.g., Whiten, 2019) and how humans’ social worlds shape our behavior (e.g., Haun & Over, 2015; van Schaik & Burkart, 2019). However, such studies on conformity fail to properly address the overarching finding that in each and every sample in which there is conformity there is also non-conformity. Fewer studies have addressed this ubiquitous variability in conformity propensity (for a notable exception using adult participants, see Wijenayake et al, 2020) which potentially can help us expand our understanding of conformity.

## Dispositional Correlates of Children's Conformity

A primary aim in the current work was to investigate whether personality traits of participants are predictive of general propensity and motivation to conform. Such research questions, tapping dispositional characteristics and their relation to social learning and conformity, have been highlighted by Marble and Boseovski (2020) as well as Rawlings and colleagues (2017) as a necessity to understand the variability in, for example, learning strategies that children adopt. I additionally argue that if psychological differences pertaining to cognitive or emotional domains can be tied to propensities or motivations to conform – it would potentially allow for inferences about the very nature of “the conformist” and “the non-conformist” hypothetical characters and would add to our overall understanding of conformity as a complex social phenomenon.

Resting on findings that FFM is a reliable and valid means of assessing individual differences in young children (Zupančič, & Kavčič, 2005), that these are stable over preschool years (Zupančič, Sočan, & Kavčič, 2009) and even predictive of characteristics these children will have as adults (Caspi, Harrington, Milne, Amell, Theodore, & Moffitt, 2003; de Haan, De Pauw, van den Akker, Deković, & Prinzie, 2017), I employed FFM to assess personality traits in the studies for this thesis.

We initially did not find any support for FFM personality traits being directly predictive of children's propensity to conform to adults (Study I). However, in Study III, we found a U-shaped relationship between extroversion and conformity to peers and using pooled data from both studies analyses in addendum analyses there is indication that the U-shaped extroversion effect is similar across the two datasets. Importantly, across both studies, variability in conformity propensity was also larger at the ends of the extroversion spectrum. This indicates that children with average scores on extroversion were unlikely to conform and that children with high or low scores on extroversion were more variable in propensity, which drove the U-shaped effect. Analyses based solely on conforming trials show an additional effect of extroversion (Studies I and III) and openness (Study I) that had explanatory power over the motivation behind the public conformity. That is, higher extroversion was predictive of conforming for a normative motivation (believing that the majority was incorrect but conforming for social affiliation) and lower extroversion was predictive of conforming for an informational motivation (believing that the majority was correct and conforming for epistemic advantages).

In Study III, both high and low extroversion were predictive of conformity to the majority's false testimony. I argue that this reflects two effects. Firstly, participants who are rated higher on extroversion are inherently more engaged in their social world. This can lead to them to being more avoidant of risking being seen as non-cooperative, solitary, or even as an antagonist to the unanimous majority, and thereby more prone to conforming to their norm. The

same effect can also be explained by them being more prone to actively befriending the majority without any fear of ostracism. Importantly, it can also be that highly extroverted participants simply value social information more highly, potentially overriding perceptual information and leading them to accept the majority testimony as true. Of course, these factors are not mutually exclusive. Secondly, participants who are rated lower on extroversion are inherently more reluctant to draw social attention to themselves. Low extroversion participants may thus conform as a means of assimilation rather than affiliation, reflecting an avoidance of undesirable social engagement.

In Studies I and III, we additionally investigated conforming trials exclusively to examine the motivation behind them. We found that participants who had normative motivations were more common when participants had higher extroversion and informational motivations were more common when participants who had lower extroversion. I offer a tentative explanation for this effect. As previously suggested, more extroverted participants may be more inclined to affiliate with the majority or to trust the majority consensus. Additionally, more extroverted participants may process social information more readily – that is, once they have conformed, more extroverted children keep perceptual and social information separated and are better able of strategically switch back to their initial private assessment. This may also reflect that less extroverted children are “overwhelmed” with the social information that conflicts with their perceptual assessment, leading them to temporarily confuse the task’s end-goal during trials to a larger extent, and therefore their private belief mirrors the information that was given during their public conforming.

In Study I, participants who had higher scores on openness were more likely to conform for an informational motivation, thus changing their belief about which target was correct. This effect is likely explained by children with high openness scores being also inherently more open to other ideas and also more susceptible to new information – whether it is accurate or not. Again, openness did not predict a general propensity to conform, but rather that when a participant conformed, high openness scores were predictive of privately holding the inaccurate conforming answer as true. It is therefore possible that the high openness participants were more susceptible to internalizing the information as true when conforming. This effect did not replicate using peer confederates in Study III, possibly indicating an inconsistency based on confederate age. I believe the most plausible explanation is that the effect of openness reflects trust and is most prominent when confederates are seen as expert or authoritative informants and is diminished when confederates are peers. That is, children high on openness tend to internalize especially adults’ false testimony as true because children generally see adults as more knowledgeable and informed than same age peers (e.g., Rakoczy, Hamann, Warneken, & Tomasello, 2010). When it comes to peer confederates, children’s trust is a less important factor and internalization of testimony is instead contingent on social information processing as tapped by extroversion. Likewise, children

low on openness are less prone to internalize adults' false testimony as true, yet again, when it comes to peers' false testimony the social information processing style is mainly predictive of whether a conforming child holds their answer as being true. Whether this is best explained by openness' effect being slightly weaker compared to extroversion's and thus failing to emerge in Study III, or if conformity to peers differs from conformity to adults and openness lacks predictive power for children's motivation to conform to peers, cannot be determined from the current findings.

How well do the effects of personality on conformity propensity and motivation generalize to older children and adults? On the one hand, cognitive development is extensive during preschool age and childhood – the maturation of the prefrontal cortex alongside vast increases in social interaction experiences allows for increasingly complex cognitive processing and a richer understanding of others and one's relation to others. Compared to 3.5-year-olds, older children and adults have a larger socio-cognitive skillset, granting them access to a more nuanced interpretation of their social world, as well as the ability to interact more strategically. On the other hand, there are no indications that children's and adults' conformity differ in fundamental characteristics or motivation: all age-groups conform for both normative and informational motivations and propensities are overall comparable. I therefore argue that the nature of conformity is more similar than dissimilar across the lifespan. Firstly, conformist behavior is present already in the youngest age where it is reliably assessable using a paradigm also suitable for adults. This suggests that conformity is not contingent on more complex cortical processing or strategic top-down processing of social information found in older participants. Secondly, there are no theoretical assumptions that the elemental motivations for conformity should differ across age groups, that is, the epistemic or social drivers of conformity are likely comparable over all ages. What does differ in characteristics of conformity across age groups is the accessibility to higher-order cognitive abilities, for example more complex reputation management, meta-analytic reasoning, and more long-term aspects of strategic affiliation. However, given the comparability of young children's and adults' conformity, there is no support for the idea that such abilities are requisite for conforming. It is thus likely that higher-order cognitive abilities modulate the more rudimentary conforming processes, both independently and through interactions with other factors.

## Parental Correlates of Children's Conformity

A second aim with this thesis was to assess whether parents influence their children's behavior and social learning through their parenting style or their dispositional characteristics. The parent, including both psychological disposition and child rearing strategies, makes up a foundational domain in the

child's psychosocial world (Darling & Steinberg, 1993). Children's exploration of their worlds, although they are individuals with agency, is strongly influenced by their parents and the dyadic relationship (Feldman, Bamberger, & Kanat-Maymon, 2013). I hypothesized that children's social behavior as assessed through conformity propensity could be partially explained by their parents' personality (Studies I and III) and child rearing style (Study II).

In Study I, more extroverted parents had children who generally conformed less than children of more introverted parents. No effects of other personality traits were observed. The exact nature of this link is of course unknown, but a reasonable explanation for this effect is that children's social worlds differ depending on their parents' level of extroversion. That is, highly extroverted parents are more likely than more introverted parents to actively seek out and engage in social events, therefore also exposing their children to more active, and perhaps richer, social interactions (Browne, Meunier, O'Connor, & Jenkins, 2012). Such variability in exposure level to social and group behavior likely leads to variability in social understanding, richness of behavioral repertoires, and perhaps social abilities, thus also producing variability in social behavior (e.g., Ortiz & Barnes, 2018). Whether this is best explained as differing levels of social information processing (extroverted parents' children discern false social information more readily), trust in unfamiliar adults (extroverted parents' children know that not all adults are trustworthy), or other factor (e.g., extroverted parents' children are more comfortable with being socially deviant) is unfortunately beyond the scope of this thesis to address fully.

In Study II, fathers' authoritarian parental style predicted children's conformity propensity. This finding is in line with a report of parental RWA correlating with children's conformity (Guidetti, Carraro, & Castelli, 2017), although their finding showed links from primarily maternal RWA. Firstly, whereas authoritarian parenting is a conceptualization of parenting strategies and end-goals of child-rearing, for example, valuing obedience and good manners over individualism and curiosity, RWA reflects more ideological and cognitive patterns in which, for example, social conformity, adherence to norms, and submission to authorities seen as legitimate, are valued (Feldman, 2003). With that said, authoritarian parenting is more frequent among high RWA parents (Manuel, 2006), and does lead to children placing less trust in adults who deviate from social norms (Passini, 2017; Reifen Tagar, Federico, Lyons, Ludeke, & Koenig, 2014). Secondly, previous studies investigating children's social behavior have similarly observed differential effects of mothers' and fathers' parental style. For example, fathers' – but not mothers' – authoritarian parental style has been linked to externalizing behaviors in toddlers and young preschoolers (Carapito, Ribeiro, Pereira, & Roberto, 2018; Rinaldi & Howe, 2012). It has also been highlighted that discrepancies in the maternal and paternal bi-directional effects on children's temperament and social behaviors are poorly understood (Wittig & Rodriguez, 2019). In line with these findings, I argue that the effect of paternal authoritarian parenting on

children's conformity found in Study II reflects that authoritarian parenting inherently promotes non-deviant and normative behavior and beliefs in children. That maternal authoritarian parenting did not show predictive power on children's conformity can possibly be explained by floor effects in our sample (both mothers' and fathers' ratings of maternal authoritarian parenting was low in Study II). However, given the above descriptions of differential effects of parental style and parent gender on children's behavior, it can also be that maternal authoritarian parenting does not affect parts of children's social behavior that can be tapped through their conformity.

In Study III, we were not able to replicate the effects of parental Extroversion as hypothesized and reported in Study I. Here, maternal Conscientiousness and paternal Openness were the only significant personality dimensions. While these findings are interesting and it would be possible to generate several plausible mechanisms of actions that could theoretically explain these links, I see these findings as exploratory, given that they were not hypothesized and do not have a clear basis in previous literature. These findings should therefore not be used to infer causal or correlational effects in the current thesis, but rather to highlight the complexity of the relationships between parental characteristics and child behaviors, and to inform future hypotheses.

The addendum analyses of the dataset which underlie Studies II and III indicate that the effects of fathers' authoritarian style explain variance in the participants' public conformity that is unique to the variance explained by the participants' extroversion.

## Children's Conformity to Adult and Peer Majorities

Children conform to peers (Haun & Tomasello, 2011), older children (McGuigan & Burgess, 2017), adults and teachers (e.g., Corriveau & Harris, 2010), as well as to robots (Vollmer, Read, Trippas, & Belpaeme, 2018). While some studies indicate that children tend to conform more to peers than to adults (e.g., Berenda, 1950), others highlight that children conform to, or trust, older children and adults more than their peers (e.g., McGuigan & Stevenson, 2016). Whether these differing rates pertain to differences in experimental paradigms across studies is not quite understood. Firstly, one could speculate that young children have a larger goal to affiliate with peers than they would with adults or (much) older peers, leading to higher rates of normative conformity to peer confederates. Secondly, young children may to a larger extent assume that adults or older children know better than themselves, leading to higher rates of informational conformity to such confederate age-groups. Thirdly, young children may infer that adults are an authority and the act of conforming also reflects an act of obedience or deference. That is, depending on which motivation to conform that is primarily elicited by the paradigm – including the perceived difficulty of the task, perceived social appeal of the confederate

group, and the instructions by the experimenter – the observed rates of conformity to different-aged confederates would also vary.

The current work shows that conformity rates in the two otherwise similar paradigms elicited higher conformity rates with adult confederates (Study I, 48 %) than with peer confederates (Study II, 20 %). The proportions of informationally and normatively motivated conformist answers also differ (Study I 50% informational and 50 % normative; Study III 67 % informational and 27 % normative). This reflects that in Study I, the more extroverted participants were also engaging in informational conformity to a larger extent. Yet, addendum analysis of the effect of extroversion squared on conformity propensity shows that extroversion has a similar U-shape across both studies. This indicated that children with high and low extroversion conformed more to both peer and adult majorities and thereby suggests shared characteristics of conforming to both age groups. Likewise, across both datasets high extroversion was predictive of a normative motivation and low extroversion of an informational motivation, also indicating that a dispositional characteristic has similar effects across conformity to both age groups. Given the additional finding of Study II in which conformity and obedience did not correlate significantly (of course, noting that our measure of obedience was not ideal due to a ceiling effect and low variability, and that the conformity was to peers and not adults) this lends additional support to conformity not being confounded with obedience, at least not in all cases. Had there been a measure of obedience in Study I as well, a similar non-significant relationship between conformity and obedience would have made a more conclusive rejection of this possibility. However, it may be the case that conformity to adults as measured in Study I would instead have correlated with an identical measure of obedience as used in Study III, thus implying that obedience may still be a factor in conformity to adults. Taken together, the effect of extroversion on children's conformity is similar across conformity to peers and adults, both regarding propensity and motivation. Yet there was a considerable difference in conformity rates across the two datasets, in which there also was differing rates of motivation. We therefore suggest that there are similarities in conforming to different-aged majorities but that it is plausible that children's conformity to peers is in part driven by qualitatively different mechanisms or end-goals than conformity to adults.

## Conformity's Shared Variance with Altruistic Behavior

Children's selfless prosocial behavior has been subject to scientific scrutiny parallel to conformity, yet these two social behaviors have not been assessed simultaneously to allow for correlational analyses until now.

In Study II, children who conformed to a larger extent were also more willing to anonymously share their won marbles with a fictive peer, an established

measure of altruism. Because of the interrelations between these two behaviors, and other included factors in the study, this opens up a few additional inferences about the nature of children's conformity. Firstly, altruistic sharing and conformity are directly correlated indicating a potential linkage between these two behaviors. Secondly, obedience and conformity were not associated with each other, nor was altruistic sharing associated with obedience, indicating that obedience does not moderate or confound this linkage. Thirdly, authoritarian parenting was predictive of conformity, but not of altruistic sharing, indicating that the linkage between altruistic sharing and conformity is not moderated by or confounded with parenting style. Taken together, these findings suggest that altruistic sharing and conformity share unique variability.

The first, and in my opinion the most plausible, explanation for the link between altruistic sharing and conformity is through humility. That is, parental ratings of their children's honesty-humility (HEXACO model of personality; Ashton & Lee, 2007) have been shown to be predictive of their anonymous sharing (Allgaier, Ścigala, Trautwein, Hilbig, & Zettler, 2020). Honesty and humility have facets of greed avoidance and fairness, which are relevant for altruistic sharing, likewise they have facets of modesty, which is potentially relevant as being predictive of conformity. Because children who have higher scores on greed avoidance and fairness also tend to have higher scores on modesty (Ashton, Lee, & De Vries, 2014), I argue that this testable explanation is a plausible candidate. A second explanation, which I believe is less plausible, is through social cohesion. This link is more theoretical in nature and encompasses notions of comradery and group affiliation. What makes this different from the humility pathway is that it may be more proactive: Children who actively wish to affiliate with others and use conformity as a strategic means, consciously or not, may also be more sensitive to others who risk being left-out. This may be due to the exclusion in and of itself, or a sense of fairness. The common denominator here is that of social cohesion – a group should be inclusive and homogenous – whether it regards a third-party peer or the child itself, or whether it regards material resources or group beliefs.

## Aligning Current Findings with Extant Theoretical Frameworks

Evolutionary models of conformity and conformist- and cultural transmission aim to explain how human groups tend to be similar and maintain unique cultural variants – such as beliefs, behaviors, and moral values – over time. Key findings from such reports include the notion of conformity or conformist transmission, defined as individuals' disproportionate copying of some variant within their culture (e.g., a conformist being more likely to copy and adopt a

behavior than the ratio of members who are using it), is intrinsic to or contingent on other social behaviors (e.g., social learning, Henrich and Boyd, 1998). For example, conformist transmission has been shown to be interlinked with altruistic behavior. That is, in groups where individuals place group members' needs before their personal needs, groups can become larger while sustaining cooperation. Such groups favor conformity more strongly – indicating an evolutionary link between altruistic behaviors and conformity (Guzmán, Rodríguez-Sickert, & Rowthorn, 2007). In Study II, children who conformed to the peer majority were also more likely to anonymously share their marbles with a fictive peer – a costly prosocial behavior that arguably is an act of altruism. Additionally, I argue that this correlation between altruistic behavior and conformity in Study II also fits well with the social alignment theory presented by Shamay-Tsoory and colleagues (2019). The social alignment theory suggests that conformity, along with emotional contagion and synchronized movements, are enabled by common overarching social abilities and shared neural networks. That emotional contagion, a case of spontaneous emotional empathy, may drive altruistic behavior (e.g., Sally & Hill, 2006) is not a controversial statement. If emotional contagion together with conformity share common neural substrates (core alignment system; Shamay-Tsoory et al, 2019) the finding that 3.5-year-olds' altruistic behavior and conformity to peers correlate lends support to this theoretical framework.

From an experimental point of view, conformity is predominantly viewed as a socially motivated behavior rather than a rational artefact of information processing, as it could be described from a cognitive psychology point of view. Although there are aspects such as belief updating, information processing, and information weighting that could be applied to the conforming process, such information processing modelling of conformity is mostly limited to neuroscientific frameworks of conformity. When conforming for either normative or informational reasons there is indeed likely a parallel processing and weighting of the perceptual versus the social information that could be modelled from a rational information processing perspective. When investigating conformity that occurs for informational reasons, such a perspective may prove to be a fruitful one. However, the normative motivation has such a clear and salient social component and thus a social psychology perspective is intuitively more advantageous.

## Strengths and Limitations

A few caveats should be noted and discussed. First, although the paradigms used were similar or identical in many aspects, Study I only had two targets (correct/non-conforming versus incorrect/conforming) while Studies II and III were based on three available targets (correct/non-conforming; incorrect/conforming; and incorrect/nonconforming). The third option was introduced to

allow for potential anti-conformity, referred to as being maverick (Efferson, Lalive, Richerson, McElreath, & Lubell, 2008). However, this option was rarely used by participants for public or private answering and was therefore not separately analyzed. Secondly, our measure of obedience did not lead to a lot of variability across participants, as reflected by only binary all or none responses and a ceiling effect. Initial pilot testing indicated a larger behavioral variability for this and we were careful not to construct a test which risked the joy of participation for our participants, nor their well-being. Perhaps the ceiling effect could have been mitigated by increasing the task's tediousness, although at the risk of making participation less fun for the participant. Thirdly, the use of live confederates in Studies I and II may have yielded larger conformity rates (the on-screen adults in Study I yielded 48% which is sufficient). However, even if the rate was slightly lower than what would be statistically optimal, it is comparable to similar studies. Importantly, the on-screen confederates were introduced as being actual peers, co-participating from other rooms in the building, and there were no indications that the participants did not believe this. After the experiment, many participants asked whether they could meet or see the other children before leaving.

A strength with our approach is the use of eye-tracking to assess participants' private belief. Previous approaches to tapping what the participant holds as true necessitated an explicit response to the Experimenter. This poses a threat to measurement validity, as I will delineate here using a conforming trial as an example: In each trial, the participant first sees the stimuli and most certainly forms a perceptually based idea of what the true answer is. Following this, the participant observes confederates holding opposing views and an epistemic or social conflict arises within the participant (do they know better than I do?; should I align my answer to theirs?) to which the participant folds when conforming. During the moments of conforming, when the participant publicly announces that their answer is in line with that of the inaccurate confederates, what is the participant's de facto belief of what is true? When the Experimenter again, after some seconds have elapsed, asks the participant for a "private" answer that is not to be heard or disclosed to the confederates – does the participant reevaluate the stimuli again using the still visible stimuli or a mental representation of them? If so, does a correct answer, ostensibly indicating normative conformity, truly reflect that the reason for the public conformity was normative – or – is the private answer based on a reevaluation of the stimuli perhaps even independent from the conforming answer? I argue that we cannot ascertain that children who publicly conform did so for a normative motivation, consciously or not, and would have moved on in their lives not reflecting over the fact that they knew that their answer was wrong. Therefore, I also argue that the preferential looking paradigm that was employed in the current thesis mitigates this threat to validity. Here, the Experimenter asks the participant to look towards the target they believe is correct, without them

having to explicitly form a second answer, and thus minimizing the likelihood of them making a reevaluation of their first answer.

Following this, the distinction between normative and informational conformity may not always be a result of the participants' initial motivation. We infer the conformity motivation by assessing the epistemic end-result of the conforming trial (the participant believes that the confederates were either correct or not correct), which may not always be true. For example, a participant may have a strong goal to affiliate with the confederates while knowing that they on occasion provide inaccurate testimonials. However, if the task seems irrelevant and there is no explicit instruction to reevaluate their deliberately inaccurate answer – the participant may internalize their conforming answer as being true. This distinction is important because it highlights that normative conforming can have unintentional epistemic effects. However, the current study cannot answer to what extent this potentially occurs.

Lastly, a few issues of generalizability and representativeness. While demographic data was not collected on the participants in the current research, they were all living in Sweden and the majority of them were white and from households with high parental education which may limit the generalizability of the current findings. Although research clearly shows that conformity is a universal phenomenon, there are cultural effects that need to be addressed in order to deepen the understanding of conformity and what motivates it. For example, individuals from collectivist cultures tend to conform more than individuals from individualist countries (Bond & Smith, 1996) and adults ascribe children's conformity different characteristics across cultures (Clegg, Wen, & Legare, 2017). Because Study II shows that how children are socialized affects their propensity to conform, we can infer that systematic variability over cultures likely also has an impact on children's social behavior. Generalizing individual differences from one culture to another therefore needs to be made with caution. Additionally and as covered in the background section, various socio-cognitive abilities undergo drastic development during the preschool years. For example, three-year-olds are seen as malleable and more indiscriminately entrusting compared four-year-olds (Koenig & Harris, 2005; Ma & Ganea, 2010; McDonald & Ma, 2016; Schillaci & Kelemen, 2014). Of course, decreasing conformity rates during this period do not linearly reflect children's increasing ability to discern inaccurate testimony, but rather that several cognitive abilities are maturing in parallel. Thus, the impact that majority testimony has on three- compared to four-year-olds is not merely quantitatively more powerful. A more accurate depiction of this difference is that it also reflects developing cognitive abilities.

I argue that individual differences approaches to conformity motivation are key to understanding both propensity and motivational differences for conformity in cross-cultural and developmental studies on conformity. Using personality traits, parental style, and potentially other factors that can theoretic-

cally be linked to conformity, together with cultural descriptions of individualism vs. collectivism – pitfalls of spurious relationships or confounding with omitted variables can be avoided. Moreover, looking towards information processing modelling found in cognitive psychology can additionally add perspectives on motivational aspects of conformity. If informational conformity is a rational artefact of information weighting – can the effects of extroversion be better explained or further understood by a shift of perspective, and can other dispositional or cognitive factors be included? Most importantly, such investigations could give rich and nuanced data from which meaningful inferences can be made, enlightening us about the very nature of this complex and essential behavior.

## Final Conclusions

Children's conformity, what might be considered an odd behavior where children give inaccurate answers when we think that they ought to know better, is instead a complex and functional behavior which is intrinsic to human social life. The empirical studies presented in this thesis have an individual differences perspective on conformity and conformity motivation with an overarching aim to describe the nature of conformity and the potential dispositional differences between conformists and non-conformists. Key findings are that (1) the FFM personality trait extroversion of children has a U-shaped relationship with their propensity to conform and that when children conform, children high on extroversion do so for both normative and informational reasons, while children low on extroversion tend to only conform for informational reasons; (2) children's conformity is positively correlated with their altruistic behavior; and (3) type of childrearing influences children's propensity to conform as fathers' authoritarian parental style predicts conformity propensity in their children.

The understanding of the very nature of conformity is intriguing as it is one of the keys to understanding many other aspects of human behavior, cultural differences, learning, and development. Individual differences perspectives on informational and normative conformity (and non-conformity) can inform us about what characterizes a 'conformist', which in turn may let us infer about the nature of conformity. In this thesis I have focused on 3.5-year-old children and described that individuals' trait social engagement level as assessed through extroversion is an important factor. From a dispositional perspective, the findings hint at conformity being foremost a phenomenon pertaining to social engagement levels, as conformity is almost exclusively associated with extroversion. We did not find, for example, that high conscientiousness buffers against conformist responding or that high neuroticism or agreeableness increases it. Such findings would have intuitively fit our conceptions of conformity. However, that we found no effects of these dimensions suggests that

they do not drive or modulate conformity propensity: Impulsive or spontaneous children are *not* more prone to conform than dutiful and focused children (conscientiousness), cooperative and trusting children are *not* more prone to conform than unfriendly or skeptical children, and anxious children are *not* more prone to conform than their calmer counterparts. Instead, the primary motivator from a dispositional perspective is social engagement level. That is, how we relate to, interpret, process, and value social information is the primary factor in conformity.

Future studies will hopefully add to these findings by targeting other age groups or cultures and by modifying and improving methodological parameters. Studying the nature of conformity, social learning, selective trust, and how humans socially influence each other is perhaps more important than ever. For example, understanding why some individuals are more prone than others to trust and adhere to unwarranted norms and narratives is part of the foundational knowledge needed to reduce adherence to misconceptions and deceiving narratives, and ultimately what is *true*. The world is often too complex for any individual to form accurate representations experientially and we all need to rely on information given to us by others – ideally experts. Conforming to majority testimony can thus be argued to be an objectively correct behavior given that one can discern that the majority knows better, have access to more information, and – importantly – have good intentions. The opposite can be argued to be true whenever one or more of these criteria are not fulfilled. Why some individuals are more prone to trust a majority of experts than others and why some are more likely to trust a minority’s testimony over a majority’s are open questions. There is large variability in such propensities to selectively conform, and adults and children conform even when they should know better. Does part of this variability pertain to abilities to discern unwarranted testimony and soundly evaluate the epistemological grounds of conflicting testimony? Which (meaningful) factors best explain such types of variability is unknown. I believe that individual differences approaches need to be considered alongside other factors, to comprehend the variability in adults’ as well as children’s and adolescents’ behavior in social influence contexts. Combining such findings with research on topics such as information seeking behavior or group communication, such scientific inquiries will be part of identifying and understanding, as well as addressing and intervening to mitigate unwarranted belief systems such as vaccine hesitancy, climate change denial, and other malign conspiracy theories.

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and you know you've seen it all”

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