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Autism Beyond Deficits: Embracing Neurodiversity in Research

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Abstract

Autism Spectrum Disorder (ASD) is often studied from a deficit-based perspective, but the recent "neurodiversity paradigm" offers an alternative, more nuanced approach. By critically analyzing three distinct studies, I demonstrate how a shift towards neurodiversity leads to more consistent interpretations of ASD, improving the quality of scientific research. The first study on decision-making reveals potential cognitive strengths of autistic individuals, challenging traditional deficit narratives. The second study on morality illustrates the pitfalls of deficit-based research, inadvertently pathologizing moral integrity. The third study on dualism is an example of how the idea of impaired theory of mind skills in ASD can lead to contradictory conclusions when taken for granted. I conclude the analysis by advocating for increased involvement of autistic individuals in research and a greater emphasis on neurodiversity to enhance scientific understanding and societal acceptance of ASD.

Keywords of the paper: autism, neurodiversity, philosophy, social cognition, theory of mind

Introduction

As a condition directly related to differences in social communication, Autism Spectrum Disorder (ASD) is one of the most studied conditions in the field of social cognition (World Health Organization, 2019). Most of the research is done with a normative approach, focusing on the deficits of autistic people, and using non-autistic subjects as healthy control groups to establish norms for the main topic of the study. However, as indicated by the word "spectrum", ASD is highly heterogeneous, where each symptom can have vastly different presentations in different individuals, with a wide range of abilities and disabilities that affect all aspects of life, which is usually lost in the classical, normative approaches (Baron-Cohen, 2017). A recent framework, named the "neurodiversity paradigm", popularized by autistic people themselves, offers a different perspective.

According to the neurodiversity paradigm, ASD should not be seen as a disorder that only causes deficits, but a natural variance of the human brain. Autistic people have their own strengths and weaknesses. Simon Baron-Cohen, one of the most prominent researchers on ASD, has also embraced this paradigm. In his 2017 editorial paper titled "Neurodiversity – a revolutionary concept for autism and psychiatry", Baron-Cohen investigates autism-related differences in genes, brain structure, individual neurons, fMRI data and cognitive-behavioral abilities (Baron-Cohen, 2017). He claims that all of these differences can be understood as natural variances that can cause problems in certain contexts but can provide strengths in others. He then proposes to categorize ASD as a disability rather than a disorder, as the term "disorder" implies only deficits, while a disability depends on the context and presupposes that needs can be accommodated for in order to make the individual's life easier.

Baron-Cohen is also known for the theory that autistic people lack theory of mind (ToM) skills, meaning they cannot infer the mental states of others (Baron-Cohen et al., 1985). This still seems to be the default assumption in autism research, but there are criticisms (Gernsbacher & Yergeau, 2019; Gough, 2021; Leudar et al., 2004) and alternatives (Davis & Crompton, 2021; Edey et al., 2016; Milton, 2012; Sheppard et al., 2016) to this view as well. For example, a systematic review by Gernsbacher and Yergeau (2019) shows that whenever current ToM tasks fail to prove the idea, new tasks are being developed specifically for autistic people to fail, yet the evidence is still not conclusive. The authors emphasize that this perpetuates discrimination against autistic people and does more harm than good. Therefore, we should be careful before including this idea in our research.

Milton (2012) offers an alternative to the idea of impaired ToM in ASD, called "the double empathy problem". Rather than assuming an inherent lack of ToM in ASD, this theory reframes mind reading as a two-way process. In order to infer the mental states of another person, one needs

to be able to predict how their minds work. Since autistic minds work fundamentally differently, they fail at predicting the non-autistic population's mind states. However, it is not only the autistic mind that fails to read the other. Non-autistic people fail at predicting the autistic mind too, creating a two-way mismatch between the two populations. Furthermore, the "predictive processing paradigm" offers a new, low-level explanation of the atypical perceptual and cognitive processes in autism, including social difficulties (Cannon et al., 2021).

If , as the neurodiversity paradigm suggests, ASD is a natural variance of the human brain that can manifest either as a disability or as mere differences, then research done with a deficit-based perspective can cause problems. Furthermore, if autistic people do not necessarily lack theory of mind skills, but their difficulties can be explained by other means, then scientific research based solely on this narrative would be unjustified. Moreover, these issues could negatively affect the lives of autistic individuals, as they would reinforce the social stigma around ASD.

In the following sections, I will try to demonstrate what problems research can suffer when the neurodiversity paradigm is not considered. For this, I will use three studies as examples: In the first section, titled "Autism and Decision-Making", I will focus on a study showing that autism can be accompanied by certain advantages in rational decision-making. This will allow us to see how research can be conducted without a deficit-based perspective and how embracing autism's strengths as well as difficulties can lead to fruitful research. In contrast, the next section, "Autism and Morality", will focus on a study with a deficit-based perspective. The initial published version of the paper will illustrate how the deficit view has caused the researchers to accidentally frame moral integrity as pathological behavior. Moreover, the revisions made on the paper after its publication will highlight how feedback from neurodiversity advocates and autism researchers can improve quality of scientific discussions. Furthermore, the section on autism and the philosophical idea of dualism will demonstrate how taking the view of impaired ToM as a starting position leads to contradictory results. Finally, I will discuss these examples together to show the benefits of embracing the neurodiversity paradigm, taking feedback from autistic people themselves, and taking a more objective stance with regard to autism and theory of mind tasks.

Autism and Decision-Making

When studying a highly heterogeneous condition such as ASD, it is important to keep an open mind and not label every deviation from the norm as a deficit. Happé and Frith (2006) have reviewed studies on what is known as the "weak coherence" account of ASD, which is the dominance of local information processing over global context, creating a detail-oriented processing style. The authors have emphasized the growing literature on ASD pointing to a "superior performance on tasks requiring detail-focused processing" (Happé & Frith, 2006, p. 21), such as visual search (Happé & Frith, 2006; O'Riordan et al., 2001; Plaisted et al., 1998b), discriminating between novel patterns (Happé & Frith, 2006; Plaisted et al., 1998a) and higher pitch sensitivity (Bonnel et al., 2003; Happé & Frith, 2006). Moreover, this superiority of local processing does not necessarily correlate with impairments in social cognition or executive dysfunction (Happé & Frith, 2006). Therefore, the authors conclude that weak coherence should be seen merely as a processing bias, not a deficit.

The effects of the local processing bias can go beyond visual search tasks or pitch sensitivity, potentially affecting decision-making and lowering susceptibility to certain cognitive biases. Farmer et al. (2017) have studied rational decision-making in autistic individuals, specifically focusing on their susceptibility to the cognitive bias known as the "attraction effect". This effect comes into play when a subject needs to decide between two choices, namely A and B, which are better than each other in different aspects. The participants are also presented with a decoy option, which is worse than both choices in a targeted aspect. This causes most people to choose the option that has the

better targeted aspect. An example given in the paper is a choice between two USB drives: One with 16 GB capacity and a life span of 36 months (A) and one with 32 GB capacity and a life span of 20 months (B). When a decoy with 28 GB capacity and a life span of 16 months (life span being the targeted aspect, lower than both) is present, people tend to choose A, since that has a higher life span. But if a decoy with 12 GB capacity (targeted aspect, lower than both) and a life span of 32 months is present, they tend to choose B, since that has the highest capacity. So the consumer can be led to make a decision based on the decoy option, rather than a rational choice based on their needs.

The authors based the rationale of their study on previous findings that autistic individuals rely less on global contextual information and more on local information in cognitive and perceptual tasks (Farmer et al., 2017; Happé & Frith, 2006) and wanted to see if this effect extends to rational decision-making. Since autistic individuals rely less on global contextual information, the authors expected autistic individuals to be less susceptible to the attraction effect. They tested this using attraction effect experiments from previous studies, and the results indicated that the autistic group was indeed less susceptible to the effect, making more conventionally rational choices: Their decision-making was significantly less affected by the presence of a decoy option compared to the neurotypical (NT) group. They also measured autistic traits in the NT group using the Autism Quotient (AQ) test, and found the same effect to a lesser degree in non-autistic individuals who scored relatively high on the AQ.

The authors then concluded that autistic traits correlate with decreased susceptibility to the attraction effect, enhancing the ability for rational decision making. Rather than seeing autistic traits as inherently deficient, they approached the topic on neutral grounds and posited that "autism is not in all respects a disability" (Farmer et al., 2017, p. 1069) but may have certain strengths. This approach allowed them to study the effect in isolation without introducing confounds by making unrelated assumptions, such as theory of mind deficits. They were then able to propose new research directions to investigate why exactly this effect occurs less often in autistic people, whether it extends to other cognitive biases, and how it may affect the daily lives of autistic people (Farmer et al., 2017, p. 1074).

Overall, this study approached the subject with a neutral stance, aligning with the neurodiversity paradigm. When interpreting the effects of the local bias on decision-making, the researchers did not start with the assumption of a core cognitive deficit. The observation of reduced susceptibility to the attraction effect was not pathologized as being excessively rational but was viewed as being more consistent and in line with conventional theories of rational decision-making. This objective approach allowed them to study autistic traits as they are without further stigmatizing the condition. In the next section, I will further illustrate the importance of this approach by reviewing a study on ASD and moral behavior. The study initially takes a deficit-based view but runs into serious problems with morality, eventually having to revise their position. To provide some context, I will first discuss theories of moral reasoning and how it is studied in relation to ASD.

Autism and Morality

Moral reasoning is an important part of decision making in a social context. In psychology, theories of morality often rely on social cognition, and specifically our ability to infer the mental states of others, known as the rationalist account of moral behavior (Dempsey et al., 2020; Kohlberg, 1971; Piaget, 1932; Turiel, 1983). As ASD is associated with impairments in ToM skills, studying moral reasoning in autistic individuals can, in theory, provide evidence for or against such rationalist accounts.

To test the rationalist account of moral reasoning, Dempsey et al. (2020) have conducted a systematic review of studies on ASD and morality. One of the most consistently reported findings

was that both autistic and non-autistic people use the intention of the actor and the outcome of the action to judge an act to be moral or immoral. However, autistic people tended to give more importance to outcomes compared to intentions. When intentions and outcomes were at odds, such as a well-intended actor causing harm, autistic subjects relied more on outcomes while non-autistic subjects relied more on intentions. The authors speculate that this may be due to the lack of automatic mentalizing skills in ASD, and that autistic people may compensate by relying on outcomes to infer intentions. Autistic subjects also tended to give more concrete, rule-based explanations for their judgements, compared to neurotypical adults whose explanations were more flexible and focused more on the psychological well-being of the actor (Dempsey et al., 2020; Zalla et al., 2011).

Overall, while their reasoning was atypical, autistic participants still made similar moral judgments as the control group. If they rely on different mechanisms for mentalizing, yet reach similar conclusions, this calls into question the validity of the rationalist account. As a result of this review, the authors offer to use an intuitionist account to explain moral reasoning put forward by Haidt (2001). According to the intuitionist account, we do not make moral judgments by reason, for example by imagining ourselves in that situation. Instead, the judgments are first felt emotionally as a result of moral intuition. Only after experiencing this emotional response to moral judgments we rationalize our intuition with proper arguments. In this framework, the atypical explanations given by autistic participants would not constitute a deficit in moral judgment but merely a different explanation for the same moral intuition. This, in turn, allows studying morality in ASD without assuming a deficit-based perspective, the authors conclude. In essence, this study shows that it is possible to use different frameworks to interpret findings on moral reasoning. One framework may allow a more neutral stance, while another may lead us into deficit-based thinking. When studying morality, it is critical to avoid a deficit-only perspective, as this risks enforcing normative standards on moral judgments and inadvertently pathologizing atypical yet morally significant behaviors. Therefore, exploring alternative interpretations is crucial.

The importance of considering alternative interpretations is further illustrated by a study on ASD and moral behavior, conducted by Hu et al. (2020). In this study, autistic and non-autistic subjects had to choose between a good context, where they could sacrifice their personal gains for a morally good cause, or a bad context, where they would personally benefit from a morally bad cause. They also investigated whether the subjects made different decisions in public and in private. The study found that autistic participants were significantly more likely to stay away from the bad context compared to the non-autistic group. Notably, while non-autistic participants were more likely to choose the good cause in public and the bad cause in private, the autistic participants stuck to their moral decisions even in private. The explanation given by the authors for this behavior is that autistic participants may not be taking social reputation into consideration when making moral choices, and weighting the negative outcomes of their actions more severely compared to the non-autistic group. The latter is in line with the conclusion drawn in the review by Dempsey et al. (2020), saying that autistic people consider outcomes more heavily than intentions. When approached with a neutral stance, these findings can be built upon by further research in psychology, to reveal the mechanisms behind the slightly different behavior.

However, Hu et al. (2020) began their research with a deficit-based approach, which has caused them to project normative standards of moral behavior on an atypical population. In the original published version, the authors concluded that the differences in moral behavior of autistic subjects "are characterized not only by a failure to consider social reputation but also, more predominantly, by an over-sensitivity to the negative consequences caused by immoral actions" (Hu et al., 2020, p. 34). Moreover, the researchers also claimed that ASD individuals "suffer an undue concern about their ill-gotten gains and the moral cost" (Hu et al., 2020, p. 4). This interpretation sparked some controversy. On a blog post, Autistic Science Person (2020) argued that refusing to take part in

an immoral action, even though it can benefit the subject, does not necessarily constitute an over-sensitivity, but can be understood as moral integrity. Alternatively, one could instead interpret the neurotypical position of sacrificing moral integrity in private as an under-sensitivity. The paper itself also went under revision and a new version was published on the journal's website, changing "over-sensitivity" to "increased sensitivity", removing the parts about "undue concern", as well as other changes. In essence, corrections were made to reframe the issue in a more neutral light (Hu et al., 2021).

This controversy demonstrates that if research is conducted with a deficit-based view, scientists may end up categorizing any neurotypical behavior as correct and autistic behavior as wrong, regardless of context. Taking a neutral stance and keeping an open mind to different possible interpretations is a remedy against further stigmatizing neurodivergent populations such as ASD.

Autism and Dualism

A deficit-based view not only risks stigmatizing autistic individuals, but, when taken too far, can also introduce confounds and lead to unwarranted results. As advanced in the introduction section, the tools used for assessing ToM skills of autistic individuals are far from perfect. Moreover, alternatives to the impaired ToM idea question its credibility. Therefore, studies built upon the impaired ToM assumption may be inadvertently biased, potentially misrepresenting the true nature of the cognitive processes being studied. Berent et al. (2022) investigated the idea that human beings are dualists by nature, meaning that we are naturally inclined to believe mind to be a separate substance than the body. The authors further speculated that this dualism-by-nature is a result of ToM skills. Since ToM is thought to be impaired in ASD, they conducted experiments with a group of autistic participants and a control group. If dualism emerges as a result of ToM abilities, and if these abilities are impaired in ASD, one would expect dualism to be less common among autistic people.

The experimenters asked subjects about the embodiment of certain psychological traits, such as symbolic reasoning, having a concept of a person, and making jokes (Berent et al., 2022). In the first part of the experiment ("Body Replication"), they proposed a hypothetical scenario in which a person's body would be replicated as it is, and asked the subjects whether they think the psychological traits would transfer to the replica or not. In the second part ("The Afterlife"), they asked whether these traits would persist outside the body - as in a soul that would continue to exist after death. In the "Body Replication" scenario, they found that subjects in the ASD group were more likely to think that the same psychological traits would emerge in the replicated body, compared to the non-ASD group. In "The Afterlife" scenario, the NT group thought epistemic traits would persist in the afterlife, while the ASD group did not. These two results show, the authors suggest, that autistic people are more likely to be physicalists than dualists, as opposed to neurotypical people who are thought to be intuitive dualists. In the third part of the experiment, named "Innateness", the researchers tested whether autistic people were also more likely to be nativists, meaning they consider psychological traits to be innate. The results confirmed this assumption.

In the fourth and final part of the experiment, Berent et al. (2022) tried to find out whether the between-group differences found in the first three parts of the experiment are related to ToM abilities or not. To measure ToM abilities, they used false-belief and true-belief tasks and measured the accuracy and speed of the participants' responses. In the NT group, those with faster and more accurate ToM scores were more likely to be dualists. In the ASD group, however, the effect was exactly the reverse: Those who responded faster and more accurately to the ToM tasks were less likely to be dualists and more likely to be physicalists. The authors then attribute this effect in the ASD group to compensatory strategies based on analytical thinking. As a conclusion, the authors interpret the results as supporting the view that dualism is positively correlated with intuitive ToM

abilities.

While the results are intriguing, there seems to be one important caveat. The original assumption of the authors was that ASD is associated with impairments in ToM skills. False-belief and true-belief tasks were conducted to calculate ToM scores, which included both accuracy and response times. However, the study found no significant differences in ToM abilities between the ASD and the NT groups. Overall, the ASD group did not score worse on the ToM tasks compared to the NT group, either on accuracy or on response time. This could be interpreted as evidence against the impaired ToM idea, or would call into question the validity of these tests in measuring ToM skills. Instead, the authors suggest that autistic individuals who scored high on the ToM tasks are compensating for their lack of intuitive ToM by their "superior systematization and attention to detail" (Berent et al., 2022, p. 5). The authors did not conduct or suggest any tests measuring intuitive ToM skills which would circumvent this compensation mechanism and reveal the true impairments of ToM.

The original intention behind conducting the false-belief tasks was to evaluate ToM (Berent et al., 2022, p. 4), and not to measure analytical thinking. If autistic participants with high ToM scores have exceptional analytical abilities, one could in theory be able to measure these abilities more directly, using cognitive ability tests, instead of relying on false-belief tasks. Then, the results could be controlled by scores measuring analytical thinking skills. The study seems to have omitted this step and simply assumed without evidence that autistic participants who scored well on ToM tasks do so because they allegedly have superior analytical thinking abilities. Moreover, dual-process theories of decision-making identify intuition as a fast heuristic, while analytical thinking is presupposed to be a slower mechanism (Alós-Ferrer et al., 2016; Kahneman, 2011; Tversky & Kahneman, 1974). Using analytical thinking to compensate for a lack of intuition, then, would likely result in slower response times. However, this was not the case in the study by Berent et al. (2022). Finally, the study seems to have missed an important confound. Dualism is strongly predicted by religious beliefs (Demertzi et al., 2009). Religious people, especially Christians, are underrepresented in science, technology, engineering and mathematics (STEM) fields in the western world (Rios et al., 2023). Therefore, one could expect people with a STEM education to be more likely to promote a physicalist rather than a dualist view. Moreover, participation in STEM fields is particularly high among individuals with high autistic traits (Wei et al., 2013). This constitutes a confound, since the physicalist views of the ASD group could be correlated with a STEM education rather than an impairment in ToM skills. Berent et al. (2022) did not control for profession or education.

As demonstrated, taking the impaired ToM view for granted can lead researchers to ignore important confounds. Furthermore, it can add to the confusion around what ToM is and how it is measured (Gernsbacher & Yergeau, 2019). Considering alternative hypotheses in line with the neurodiversity paradigm can help overcome these obstacles.

Discussion

When conducting research on ASD, the idea of impaired ToM needs to be challenged. While highly prevalent and persistent, this idea increases the stigma around the condition without strong empirical support, as revealed by Gernsbacher and Yergeau's (2019) systematic review. My review of the study by Berent et al. (2022) further illustrates the pitfalls of this idea. False-belief tasks were included in the study to measure ToM skills. However, when the autistic group scored similar to the control group, the results were reinterpreted as evidence for superior analytical thinking, without directly testing for such skills. This is likely the result of the unquestioned status of impaired ToM hypothesis. It is therefore crucial to raise awareness about the criticisms around this idea and offer alternative ways of conducting research. In line with the double empathy problem put forward by Milton (2012), Davis and Crompton (2021) have reviewed recent findings on ASD and suggest a roadmap for creating

new assessments of social-cognitive abilities in autistic people.

In addition to questioning the impaired ToM hypothesis, scientists should not in general assume a deficit-only view of ASD. When the behavior of autistic participants diverges from normative measures, scientists should not automatically assume the neurotypical position to be right and the atypical position to be wrong. In my review of Hu et al. (2021), I tried to provide a cautionary tale against this deficit-view. Applying normative standards on moral behavior has caused the authors to assume that immoral actions are acceptable as long as they are done in private. The validity of this claim, however, is not a topic of psychology, but goes into the territory of moral philosophy. If the researchers had simply described the evidence showing autistic people rely more on outcomes rather than intentions, without pathologizing this difference, these problems could have been avoided. Notably, the final, revised version of the paper is in line with criticisms by Autistic Science Person (2020). This may suggest that incorporating feedback by the neurodivergent community can actually improve scientific research. Having a more neurodiverse scientific community can be possible by encouraging autistic people themselves to go into research by creating a safe non-discriminatory environment. Increasing awareness of ASD and neurodiversity in the scientific community can also be beneficial.

Conclusion

In this essay, I highlighted the importance of embracing the neurodiversity paradigm in autism research. Autism spectrum disorder is often associated with a lack of ToM skills and is studied from a merely deficit-based perspective. My critical analysis of three studies indicates that the scientific community should move away from such a deficit-based view of ASD and accept that certain autistic traits can provide strengths rather than being pathological. The idea that autistic people do not have ToM skills also seems to be controversial and is likely to cause more problems rather than providing new, consistent insights. Finally, increasing awareness of neurodiversity and creating a more neurodiverse scientific community by having more autistic people openly involved in research can help scientific progress itself.

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About the Journal

The 'Cognitive Science Student Journal' aims at giving its readers an insight into current research and cutting-edge topics at our institute from a student perspective as well as students a platform to publish their work. Its editorial board consists of seminar participants and instructors of the Institute of Cognitive Science.

Cognitive Science is taught as an interdisciplinary research field at University Osnabrück, investigating cognition and the mind as a joint research effort of Artificial Intelligence, Neuroscience, Computational Linguistics, Psychology, Neuroinformatics, and Philosophy of Mind.

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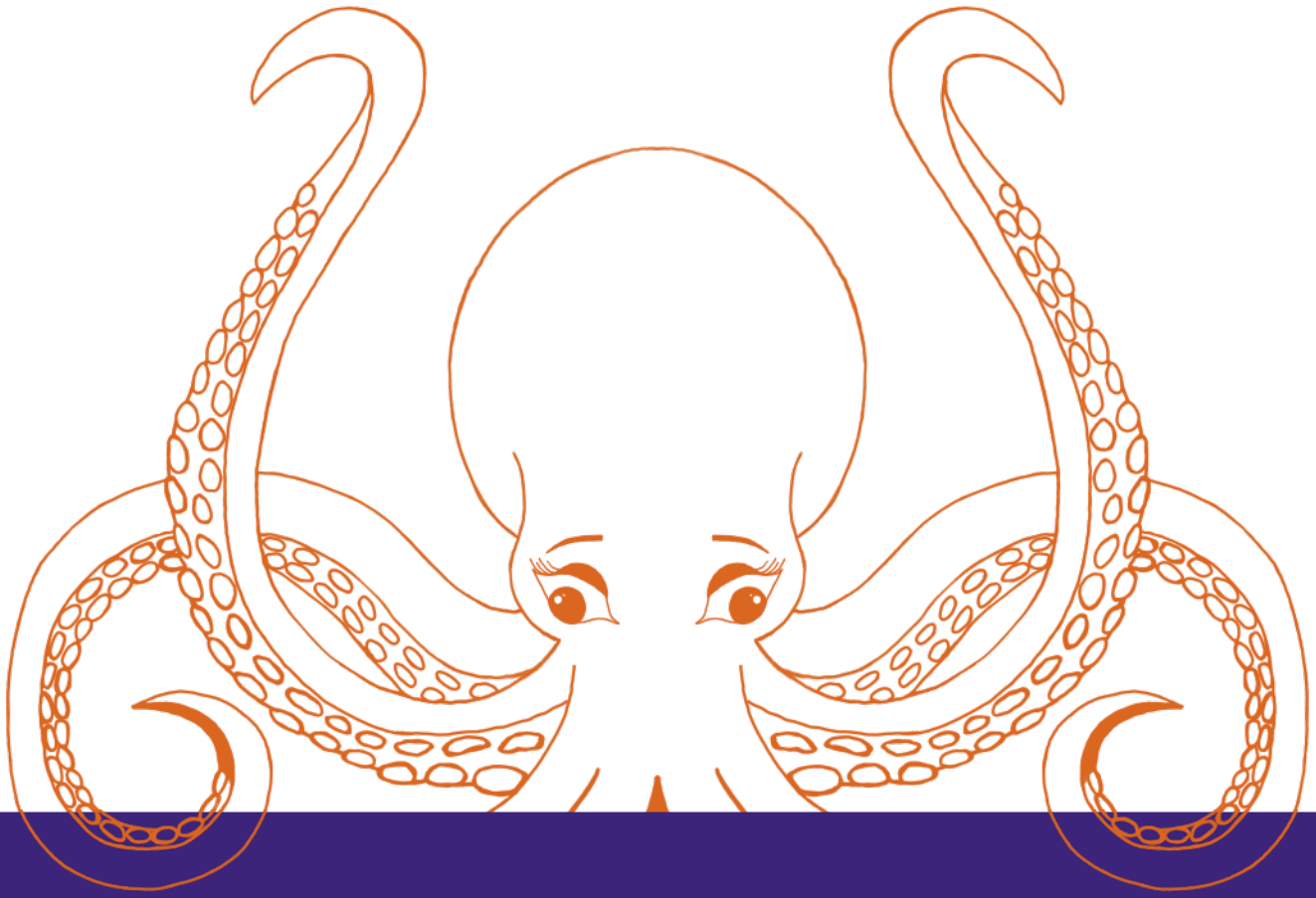

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