

# THE REVISED COMPREHENSIVE AUTISTIC TRAIT INVENTORY (CATI-R)<sup>1</sup>

Friederike Charlotte Hechler, Outi Tuomainen, Nathan Weber, Frank Fahr, Bodie Karlek,  
Marie Maroske, Meike Misia, & Nathan Caruana

## 1. CAM Subscale:

Instead of using the term “Social Camouflage”, we follow the preference of our autistic collaborators and use the term “Masking”.

Two collaborators commented:

*“As a biological term, ‘camouflage’ means adaptation. Invertebrates, for instance, that change colour or butterflies that mimic leaves use camouflaging as a mechanism of safety, and, unfortunately, autistic people mask for reasons of safety as well. However, this is not natural. It is a learned behaviour to fit in with society. So, the term masking is preferred because what we do is quite literally like putting on a mask and being someone else. Masking takes a phenomenal amount of cognitive capacity and is exhausting. Therefore, it is important to call it what it is.”* (Bodie Karlek)

*“‘Camouflaging’ is a term lent from military. The purpose is to have an advantage in war. But for us, it is daily life. Also: Nothing I do should have any connection to the military – or war for that matter. Also: Camouflaging is a tactic that is used consciously, while autistic Masking often is unconsciously.”* (Marie Maroske)

## 2. Item 1:

CATI	1	I often find myself fiddling or playing repetitively with objects (e.g. clicking pens)
CATI <sup>R</sup>	1	I fiddle or play repetitively with objects or body parts (e.g., clicking pens or twilling my hair)

Since fiddling or stimming behaviours can involve personal body parts, we added the term “body parts” along with a relevant example (e.g., flicking toes). Note that we are aware that many other forms of stimming exist besides tactile stimming, such as verbal, oral, auditory, visual, or vestibular stimming, but including all these forms would exceed the limits of this questionnaire.

## 3. Items 1, 7, 8, 9, 11, 26, 27, 30, 31:

CATI	1	I often find myself fiddling or playing repetitively with objects (e.g. clicking pens)
CATI <sup>R</sup>	1	I fiddle or play repetitively with objects or body parts (e.g., clicking pens or twilling my hair)
CATI	5	There are certain activities that I always choose to do the same way, every time
CATI <sup>R</sup>	5	I prefer to do activities the same way (e.g., how I arrange food on my plate, or organise my clothes)

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<sup>1</sup> Based on English, M. C. W., Gignac, G. E., Visser, T. A. W., Whitehouse, A. J. O., Enns, J. T., & Maybery, M. T. (2021). The comprehensive autistic trait inventory (CATI): Development and validation of a new measure of autistic traits in the general population. *Molecular Autism*, 12(1), 37–37.

CATI	7	I often rock when sitting in a chair
CATI <sup>R</sup>	7	I tend to rock my whole body or repetitively move body parts (e.g., tapping fingers, or bouncing my knee)
CATI	8	I generally enjoy social events
CATI <sup>R</sup>	8	I enjoy social events (e.g., weddings or birthdays)
CATI	9	I look for strategies and ways to appear more sociable
CATI <sup>R</sup>	9	I make an effort to appear more sociable
CATI	11	There are times when I feel that my senses are overloaded
CATI <sup>R</sup>	11	My senses can be overloaded in some situations
CATI	26	I rarely use non-verbal cues in my interactions with others
CATI <sup>R</sup>	26	I do not use non-verbal cues in my interactions with others (e.g., eye gaze, facial expression or hand gestures)
CATI	27	I often insist on doing things in a certain way, or re-doing things until they are 'just right'
CATI <sup>R</sup>	27	I prefer to do things in a certain way, or re-doing things until they are satisfactory to me
CATI	30	Social occasions are often challenging for me
CATI	31	Sometimes the presence of a smell makes it hard for me to focus on anything else
CATI <sup>R</sup>	31	A smell can make it hard for me to focus on anything else

Imprecise language might create an obstacle for autistic people. Therefore, we rephrased these items using more concrete terms. For instance, the word “often” is frequently used across items and can be difficult to map onto the rating scheme as participants must evaluate their general agreement with the statement as well as the frequency of the experience described in the item. Item 30 was also subsequently removed (see below).

Two collaborators commented:

*“The use of undefined words such as ‘often’ can be a barrier for autistic people, especially in situations where precise information is required. Instead, frequency should be described in a way that can be precisely assigned, such as ‘several times a day/10 times a week’, etc. Another problem is that ‘often’ is based on the perception of allistic people, which may differ from the perception of autistic people. There are also individual assessments to consider. For example, if an autistic individual comes from a family where there are people with ADHD, which is quite likely as we know, and the typical ADHD pen-clicking sound is the (unconscious) favourite sound of the ADHD sister/mother/brother/father/grandmother, who clicks it continuously whenever there is a pen in hand, the frequency would be assessed differently than in a neurotypical environment (which is probably assumed by the NT evaluator).”* (Marie Maroske)

*“I really struggle with terms like ‘often’ because it is not clear whether it refers to daily, weekly, or monthly. This depends all on your perspective. Likewise, the word ‘certain’ is making me think it's only some activities but, for me, I actually have a preference to do almost everything the same way every time.”* (Bodie Karlek)

#### 4. Items 1, 6, 22, 25, 26, 32:

CATI	1	I often find myself fiddling or playing repetitively with objects (e.g. clicking pens)
CATI <sup>R</sup>	1	I fiddle or play repetitively with objects or body parts (e.g., clicking pens or twilling my hair)
CATI	6	Sometimes I watch people interacting and try to copy them when I need to socialise

In collaboration with Hanan Bayrouiti, Anna Dellarosa, Franca Dellarosa, Wendy Higgins, Christian Stephan Erdmann Ambrosius Fischer, Sharon Wieries, and many others who did not wish to be named.

CATI <sup>R</sup>	6	I observe people interacting (e.g., in movies or everyday situations) and try to imitate them when I need to socialise
CATI	8	I generally enjoy social events
CATI <sup>R</sup>	8	I enjoy social events (e.g., weddings or birthdays)
CATI	12	There are certain objects that I fiddle or play with that can help me calm down or collect my thoughts
CATI <sup>R</sup>	12	Fiddling with objects (e.g., keys or soft toys) can help me calm down or collect my thoughts
CATI	22	I rely on a set of scripts when I talk with people
CATI <sup>R</sup>	22	I find it helpful to plan how I will interact with others (e.g., things to share or questions to ask)
CATI	25	I engage in certain repetitive actions when I feel stressed
CATI <sup>R</sup>	25	I engage in certain repetitive actions or activities when I feel stressed (e.g., playing with sensory toys or watching the same movie)
CATI	26	I rarely use non-verbal cues in my interactions with others
CATI <sup>R</sup>	26	I do not use non-verbal cues in my interactions with others (e.g., eye gaze, facial expression or hand gestures)
CATI	32	There are certain repetitive actions that others consider to be 'characteristic' of me (e.g. stroking my hair)
CATI <sup>R</sup>	32	There are certain repetitive actions that others consider to be characteristic of me (e.g., stroking my hair or talking about a particular subject)
CATI	38	I like to arrange items in rows or patterns
CATI <sup>R</sup>	38	like to arrange items in particular ways (e.g., in rows, patterns, by colour, by size etc.)

We are including at least two examples to help make items more concrete, without restricting the relevance of the item to a particular context or scenario. Important reasons for doing so are the general heterogeneity of the individual autistic phenotype, a major obstacle to personalising support strategies (Lord, Charman, Havdahl, Carbone, Anagnostou, Boyd,... McCauley (2022). that feature profiles of, for instance, female and male autistic people differ across a variety of domains (for an overview, see Cho et al., 2023).

#### 5. Items 3, 6, 9, 19:

CATI	Intro	Using the five response options select the option that best describes you.
CATI <sup>R</sup>	Intro	Using the five response options select the option that best describes you. When responding, think about yourself both now and across your life.

We revised the introductory instructions; guiding people to consider the relevance of statements both in the present as well as across their lifetime. This would help capture persistent characteristics of respondents' disposition, as opposed to their current context.

#### 6. Items 4, 18, 24:

CATI	4	I am over-sensitive to bright lighting
CATI <sup>R</sup>	4	I am sensitive to bright lights
CATI	18	I am over-sensitive to touch
CATI <sup>R</sup>	18	I am sensitive to touch
CATI	24	I am over-sensitive to particular tastes (e.g. salty, sour, spicy, or sweet)
CATI <sup>R</sup>	24	I am sensitive to particular tastes (e.g., salty, sour, spicy, or sweet) or textures (e.g., slippery, coarse, sharp)

The word “over-“ can be understood in a pejorative or stigmatising way and might even be a trigger for people who were accused of being “too” sensitive in the past.

One collaborator commented:

*“‘Over-sensitive’ is a very ableist word that can be triggering for many neurodivergent people, because it is a common accusation made against NDs and is often part of gaslighting: ‘Don’t be so oversensitive - don’t make such a big deal out of it.’ It suggests that the autistic perception is wrong (‘über’ = too much) - and that’s not true. It’s just different. Words that simply describe rather than evaluate, such as ‘very’ ‘strong’, ‘high’, are okay.”* (Marie Maroske)

#### 7. Item 6:

CATI	6	Sometimes I watch people interacting and try to copy them when I need to socialise
CATI <sup>R</sup>	6	I observe people interacting (e.g., in movies or everyday situations) and try to imitate them when I need to socialise

People who avoid social situations might have fewer opportunities to watch other people interact. Thus, we added movies as an example setting.

#### 8. Item 7:

CATI	7	I often rock when sitting in a chair
CATI <sup>R</sup>	7	I tend to rock my whole body or repetitively move body parts (e.g., tapping fingers, or bouncing my knee)

The specification “when sitting on chairs” might be too restricted as some people might simply never sit on chairs but engage in rocking when sitting elsewhere or when standing. Therefore, we took out “on chairs”. Instead, we made the rocking more concrete by adding “my body”.

#### 9. Items 9, 12, 17:

CATI	9	I look for strategies and ways to appear more sociable
CATI <sup>R</sup>	9	I make an effort to appear more sociable
CATI	12	There are certain objects that I fiddle or play with that can help me calm down or collect my thoughts
CATI <sup>R</sup>	12	Fiddling with objects (e.g., keys or soft toys) can help me calm down or collect my thoughts
CATI	17	I find social interactions stressful

Some people might not be aware that they are applying strategies or why they engage in certain behaviours. Therefore, we reformulated some of these items (not necessarily item 12 though since item 1 is similar but does not require the knowledge of why the behaviour occurs). Item 17 was also subsequently removed (see below).

One collaborator commented on the revised item 9:

*“I always felt that I must make an effort and that this effort often pays off. But I didn’t know that I actively search for strategies. I thought it was normal to have to make an*

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*effort for social interactions. So, I wouldn't have thought that I actively search for strategies; your phrasing is better.” (anonymous)*

10. Item 10:

CATI	10	In social situations, I try to avoid interactions with other people
CATI <sup>R</sup>	10	I try to avoid social situations that involve face-to-face interactions with people I do not know well

We modulated the sentence for various reasons: First, the idea that autistic people have a reduced desire/motivation for social interactions is misguided (see, e.g., Jaswal, and Akhtar, 2019; Morrison, DeBrabander, Jones, Ackerman, and Sasson, 2020). Their need and craving for social interaction can be strong, but they might prefer this to occur in certain ways (e.g., online, or in-person side-by-side). Further, many people, autistic or non-autistic, may have a stronger desire to interact with familiar people than with strangers.

One collaborator commented on the revised item 10:

*“The original version is nonsense, of course. I need more time to warm up to new people and usually don't feel like meeting new people, but I already have many nice people around me with whom it's nice, and with whom I don't have to make as much effort.” (anonymous)*

11. Item 13:

CATI	13	Reading non-verbal cues (e.g., facial expressions, body language) is difficult for me
CATI <sup>R</sup>	13	I find it difficult to understand non-verbal cues (e.g., facial expressions, body language) of people I don't know well

We rephrased the sentence, as there is a difference between noticing social cues and understanding them. Note that we are aware that differentiating between negative and neutral cues might be particularly challenging.

One of our collaborators commented:

*“I can read the nonverbal cues; I just don't know how to interpret them. It is a bit like the ability to read a poem. I can read the words, but I just don't understand the meaning.” (Bodie Karlek)*

12. Items 13, 26:

CATI <sup>R</sup>	44	People who do not know me well tend to misunderstand me
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Since some autistic people might not be aware of non-verbal cues in social interaction or the effect it might have not to read/use them, we added an additional item 44 that refers to the result of atypical behaviour during social interaction.

13. Item 14, 17, 37:

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CATI	14	I like my belongings to be sorted in certain ways and will spend time making sure they are that way
CATI <sup>R</sup>	14	I can have strong preferences about how my belongings are organised
CATI	17	I find social interactions stressful
CATI	37	I have difficulty understanding someone else's point-of-view
CATI <sup>R</sup>	37	I have experienced difficulty understanding someone else's point-of-view

Autistic people do not necessarily want to have all their belongings sorted in a particular way. Moreover, people with additional ADHD, the most common comorbidity in autism (Simonoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008), might not be able to actually fulfil their need for order. Likewise, autistic people do not feel stressed after *every* social interaction or have *always* difficulties understanding someone else's point of view. Thus, we reformulated these items by generalising less. Item 17 was also subsequently removed (see below).

#### 14. Item 16:

CATI	16	When interacting with other people, I spend a lot of effort monitoring how I am coming across
CATI <sup>R</sup>	16	When interacting with other people, I spend a lot of effort monitoring how I am perceived

We substituted the word 'coming across' with 'perceived' to add the connotation that the reason for this behaviour lies not *within* the autistic person but in how neurotypical people see them.

#### 15. Items 17, 30:

CATI	17	I find social interactions stressful
CATI	30	Social occasions are challenging for me
CATI <sup>R</sup>	46	I find social occasions challenging/tiring/stressful

Since we created an additional item 43, we merged items 17 and 30 (now labelled item 46) in order to stick to the construction of the original CATI (seven items per subscale).

#### 16. Item 19, 23:

CATI	19	I can easily tell how people feel from their facial expressions
CATI	23	I find it easy to sense what someone else is feeling
CATI <sup>R</sup>	45	I find it easy to sense what someone else is feeling (e.g., due to their facial expression or tone of voice)

Since we created an additional item 44, we merged items 19 and 23 (now labelled item 45) in order to stick to the construction of the original CATI (seven items per subscale).

17. Items 22, 29:

CATI	22	I rely on a set of scripts when I talk with people
CATI <sup>R</sup>	22	I find it helpful to plan how I will interact with others (e.g., things to share or questions to ask)
CATI	29	Before engaging in a social situation, I will create a script to follow where possible

As figurative language may create an obstacle for autistic people (Lee & Kamhi, 1990), making questionnaires less accessible, we substituted the term “script”. Item 29 was also subsequently removed (see below).

18. Item 23:

CATI <sup>R</sup>	43	Sensing what someone else is feeling can be stressful for me
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In contrast to being non-empathetic, some people with autism might experience empathetic overload (Gillespie-Lynch et al, 2017). This experience was not captured in any of the original CATI items. Therefore, we added an additional item 43.

19. Item 24:

CATI	24	I am over-sensitive to particular tastes (e.g. salty, sour, spicy, or sweet)
CATI <sup>R</sup>	24	I am sensitive to particular tastes (e.g., salty, sour, spicy, or sweet) or textures (e.g., slippery, coarse, sharp)

Since some people might be sensitive towards textures, not tastes, we included that option as well.

20. Item 26:

CATI	26	I rarely use non-verbal cues in my interactions with others
CATI <sup>R</sup>	26	I do not use non-verbal cues intuitively in my interactions with others (e.g., eye gaze, facial expression or hand gestures)

We added the word “intuitively” since autistic people often use non-verbal signals consciously, as a result of training but not in the unconscious way neurotypical people would do.

Two collaborators commented:

*“To say I do not use nonverbal cues is almost difficult because they’re innate. But I avoid them because I find them uncomfortable or difficult. For instance, when I’m tired, I don’t use facial expressions or hand gestures.”* (Bodie Karlek)

*“Not all autistic people avoid eye contact. Many (including me) train themselves to do this or to use facial expressions and gestures they see in others.”* (Sharon Wieries)

## 21. Item 27

CATI	27	I often insist on doing things in a certain way, or re-doing things until they are 'just right'
CATI <sup>R</sup>	27	I prefer to do things in a certain way, or re-doing things until they are satisfactory to me

We substituted the term “insist” with “prefer” because autistic people are not necessarily unaware of the effect certain behaviours might have on others.

One collaborator commented:

*“Do I insist? No, I don't insist because this would be socially inappropriate. But it feels uncomfortable if things aren't done in a certain way.”* (Bodie Karlek)

## 22. Items 27, 32, 33, 39, 42:

CATI	27	I often insist on doing things in a certain way, or re-doing things until they are 'just right'
CATI <sup>R</sup>	27	I prefer to do things in a certain way, or re-doing things until they are satisfactory to me
CATI	32	There are certain repetitive actions that others consider to be 'characteristic' of me (e.g. stroking my hair)
CATI <sup>R</sup>	32	There are certain repetitive actions that others consider to be characteristic of me (e.g., stroking my hair or talking about a particular subject)
CATI	33	Metaphors or 'figures of speech' often confuse me
CATI <sup>R</sup>	33	Metaphors or figures-of-speech confuse me
CATI	39	I try to follow certain 'rules' in order to get by in social situations
CATI <sup>R</sup>	39	I try to follow certain rules in order to get by in social situations
CATI	42	I have difficulty understanding the 'unspoken rules' of social situations
CATI <sup>R</sup>	42	I have difficulty understanding the norms or unspoken rules of social situations

Quotation marks that are not used for indicating direct speech can be misunderstood, so we removed them or, where necessary, substituted them with more concrete words that do not require quotation marks to reference a conditional meaning.

## 23. Item 29:

CATI	29	Before engaging in a social situation, I will create a script to follow where possible
CATI <sup>R</sup>	47	I tend to suppress certain behaviours even though I find them soothing

We removed this item as it repeats the content of item 22. Instead, we created an additional item 47 that offers a further masking aspect and makes sure that the number of items remains similar across subscales.

## 24. Item 32:

CATI	32	There are certain repetitive actions that others consider to be 'characteristic' of me (e.g. stroking my hair)
CATI <sup>R</sup>	32	There are certain repetitive actions that others consider to be characteristic of me (e.g., stroking my hair or talking about a particular subject)

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We added “talking about a particular subject” as a second example because it captures not only the “repetitive-behaviours” *and* “restricted-interests” associated with autism. The latter was not captured in the original items.

25. Item 34:

CATI	34	It annoys me when plans I have made are changed
CATI <sup>R</sup>	34	I feel distressed when plans are changed

We substituted “It annoys me” with “I feel distressed” as the former better describes the neurotypical interpretation of seeing an autistic person in distress.

Moreover, we deleted “I have made” as this makes the sentence too specific. A change of plans others made might create distress as well.

26. Item 35:

CATI	35	I find it difficult to make new friends
CATI <sup>R</sup>	35	I find it difficult to make new friends or maintain friendships

Some autistic people might struggle with the perceived intensity of friendships. Therefore, we added the problem of *maintaining* friendships.

27. Item 36:

CATI	36	I react poorly to unexpected loud noises
CATI <sup>R</sup>	36	I experience strong reactions to unexpected loud noises

We substituted the word “poorly” as it has a negative connotation.

28. Item 37:

CATI	37	I have difficulty understanding someone else’s point-of-view
CATI <sup>R</sup>	37	I have experienced difficulty understanding someone else’s point-of-view

Autistic people do not *always* experience this difficulty. Therefore, we have revised this item to describe it as an experience that has been encountered. The gradation offered by the rating scale should enable respondents to indicate the extent to which this statement characterises their lived experience.

29. Item 42:

CATI	42	I have difficulty understanding the 'unspoken rules' of social situations
CATI <sup>R</sup>	42	I have difficulty understanding the norms or unspoken rules of social situations

Given that “unspoken rules” are used figuratively here, since there is no book that defines how society works, we added the term “norms” to ensure people get the meaning.

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