# **Thoughts**

* Name
  + MISS: multidimensional Interoceptive Sensibility Scale
  + MInI / MInti / Mint: Multidimensional Interoceptive Inventory / MInt scale
    - « The MInt Scale: A Fresh Validation of the Multidimensional Interoception Questionnaire »
  + MIM: Multidimensional Interoception Measure
  + The Crossmodal/Transmodal Multidimensional Interoception:
* Why
  + No systematic assessment of multiple domains (organs)
  + Implicit context might lead to variability in interpretation
* Be explicit about the context: “When sexually aroused…; In general, …; etc.”
* 3 conditions? Grouping the items by context (rows) \* by modality (column) \* totally at random.
* Do PCI registered report?
* Attention checks:
  + “In general, I am paying attention to the experiment I am currently doing”
  + “I am very sensitive and attentive to the questions I am answering”
* Hypothesis:
  + Mostly an exploratory study, but one clear hypothesis that we can make is that if interoception is unimodal (cross-modal factor), the horizontal structure should be superior (less correlation between modalities and more between types). If the interoceptive domains are more independent, then within-modality correlations should be stronger.
  + “Good items” should have their structure unaffected by the manipulation (i.e., should have a clear phrasing that doesn’t introduce variability based on the context)
* Translation: French, Spanish (Sofia), Portuguese (Ana), German (Magda), Mandarin (Jing)

Discussion points

* Add physical effort as a potential separate physiological state to test?
* Add beliefs items in the next iteration of the scale (e.g., I think that listening to my heart beats helps me understand the world.)
* Explicit Adaptive vs. Maladaptive interoception
  + “e.g., you might feel anxious because you're overly aware of your heartbeat”
* Other modalities:
  + trembling/shaking of the body? Will you have any questions re: muscles/tension/clenching
* Attention dimension:
  + Include items related to “Failure to attend” (“"There have been times where I have been so preoccupied that I have forgotten to urinate?")
  + Check Murphy’s attention scale to see if any good items to be inspired by
* “LOWER INTEROCEPTION” vs. “HIGH-INTEROCEPTION” (involuntary and voluntary attention, beliefs)
  + Add a “high-interoception” addon in the future
* For the paper: add a tutorial on GitHub’ README of “how to integrate this scale in online experiments using JSPsych” (providing the js code and instructions to add it)

# **Version 1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Context | Cardiac | Respiratory | Gastric | Genital | Skin | Thermoregulation | Colon & Bladder |
| Positive Arousal (Sexual) | Cognitive: "I always *know* when I am sexually aroused"  Feeling: "I always *feel in my body* if I am sexually aroused or not at all"  Embodied - specific: "My body is in a specific state when I am sexually aroused"  Embodied - different: "Being sexually aroused corresponds to a very different bodily feeling compared to other states" | “When I am sexually aroused, I always feel changes in the way my heart beats (e.g., faster or stronger)” | "When I am sexually aroused, I feel changes in the way I breath (e.g., faster, shallower, or less regular)" | "When I am sexually aroused, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)" | "When I am sexually aroused, I notice specific sensations in my genital area (e.g., tingling, warmth, wetness)" |  | "When I am sexually aroused, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am sexually aroused, I feel my palms getting sweaty" | "When I am sexually aroused, I feel like I need to relieve myself" |
| Negative Arousal (Anxious) | Cognitive: "I always *know* when I am anxious"  Feeling: "I always *feel in my body* if I am anxious or not at all"  Embodied - specific: "My body is in a specific state when I am anxious"  Embodied - different: "Being anxious corresponds to a very different bodily feeling compared to other states" | “When I am anxious, I feel changes in the way my heart beats (e.g., faster or stronger)” | "When I am anxious, I feel changes in the way I breath (e.g., faster, shallower, or less regular)" | "When I am anxious, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)" |  |  | "When I am anxious, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am anxious, I feel my palms getting sweaty"  "When I am anxious, I feel my mouth becoming dry" | "When I am anxious, I feel like I need to relieve myself" |
| Relaxed | Cognitive: "I always *know* when I am relaxed"  Feeling: "I always *feel in my body* if I am relaxed or not at all"  Embodied - specific: "My body is in a specific state when I am relaxed"  Embodied - different: "Being relaxed corresponds to a very different bodily feeling compared to other states" |  |  |  |  |  |  |  |
| Nociception & Pleasure | “I can easily tell when I am feeling ill (e.g., nauseous or sick)” | “I often feel painful sensations coming from my heart” | “I often feel like I have difficulties breathing normally” | "I often feel pain in my stomach" | “My genital organs are very sensitive to pleasant stimulations” | "My skin is very sensitive to painful stimulations (e.g., pinching)"  "My skin is very sensitive to pleasant stimulations (e.g., caressing)" |  | “I often experience a pleasant sensation when relieving myself”  “I often experience painful sensations when relieving myself” |
| Meaning | "When something important is happening, I can feel it in my body" | "When something important is happening, I can feel immediately feel changes in my heart rate" | "When something important is happening, I can feel immediately feel changes in the way I breath" |  |  |  |  |  |
| Exteroception / Information gathering |  | “I only notice my heart when it is thumping in my chest”  “I often try to feel my heart with my hands (e.g., by putting my on my chest)” |  |  | "I often check the smell of my genital organs" |  | "I often check the smell of my armpits" | "I often check the colour of my urine"  "I often check the colour of my faeces" |
| Sensitivity | Items from “Relaxed” and “Nociception” | "I often notice changes in my heart rate"  "I am very sensitive to changes in my heart rate"  “I can always feel my heart beats, even when I’m calm” | "I often notice changes in the way I breath"  "I am very sensitive to changes in the way I breath" | "In general, I am very sensitive to what my stomach is doing” | “My genital organs are very sensitive to pleasant stimulations”  “I often notice very subtle changes in my genital organs” |  | “I am always very aware if my hands and feet are cold or warm” |  |
| Accuracy | “I can always accurately feel when I am about to cough”  “I can always accurately feel when I am about to sneeze”  “I can always accurately feel when I am about to vomit” | “I can always feel my heart beats”  “I can always feel if my heart rate is slow or fast” | “I can always feel how I am breathing (e.g., fast, slow, deep or shallow)” | “I can always accurately feel when I am about to fart”  “I can always accurately feel when I am about to burp” | “I often feel thirsty even if I drank recently”  “I don’t always feel the need to drink until I am really thirsty” | I can always accurately feel when something is going to be itchy” |  | “I often feel the need to urinate even when my bladder is not full.”  “I don’t always feel the need to urinate until my bladder is very full.” |

# **Version 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **General State** | **Cardiac** | **Respiratory** | **Gastric** | **Genital** | **Skin & Thermoregulation** | **Colon & Bladder** |
| **Positive Arousal (Sexual)** | **Cognitive:** "I always *know* when I am sexually aroused"  **Feeling:** "I always *feel in my body* if I am sexually aroused"  **Embodied - specific:** "My body is in a specific state when I am sexually aroused"  **Embodied - different: “**Being sexually aroused is very different bodily feeling compared to other states (e.g., feeling anxious, relaxed, or after physical exercise)”  “I can always tell that I am sexually aroused from the way I feel inside”  **“I always know that I am attentively doing a study”** | “When I am sexually aroused, I always feel changes in the way my heart beats (e.g., faster or stronger)” | "When I am sexually aroused, I feel changes in the way I breathe (e.g., faster, shallower, or less regular)" | "When I am sexually aroused, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)"  “When I am sexually aroused, I often feel butterflies in my stomach” | "When I am sexually aroused, I notice specific sensations in my genital area (e.g., tingling, warmth, wetness, stiffness, pulsations)"  “During sex or masturbation, I feel very strong sensations coming from my genital areas” | "When I am sexually aroused, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am sexually aroused, I feel like some areas of my skin become sweaty (e.g., palms, back)"  "When I am sexually aroused, I feel my mouth becoming dry" | "When I am sexually aroused, I feel like I need to relieve myself (e.g., by urinating)"  “During sex or masturbation, I feel like I need to relieve myself by urinating or defecating” |
| **Negative Arousal (Anxious)** | **Cognitive:** "I always *know* when I am anxious"  **Feeling:** "I always *feel in my body* if I am anxious"  **Embodied - specific:** "My body is in a specific state when I am anxious"  **Embodied - different:** "Being anxious is a very different bodily feeling compared to other states (e.g., feeling sexually aroused, relaxed, or after exercise”  “I often realise that I am anxious only when others tell me” | “When I am anxious, I feel changes in the way my heart beats (e.g., faster or stronger)”  **~~“Even if I am anxious, I don’t forget that I am currently doing a study”~~** | "When I am anxious, I feel changes in the way I breathe (e.g., faster, shallower, or less regular)" | "When I am anxious, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)" | "When I am anxious, I notice specific sensations in my genital area (e.g., contractions, dryness)" | "When I am anxious, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am anxious, I feel like some areas of my skin become sweaty (e.g., palms, back, forehead)"  "When I am anxious, I feel my mouth becoming dry"  “When I am anxious, I have difficulty swallowing”  **“Even if I am anxious, I should now answer all the way to the left”** | "When I am anxious, I feel like I need to relieve myself (e.g., by urinating)" |
| **Nociception, Pleasure** | "I always *feel in my body* if I am ill"  “I can easily tell when I am feeling ill (e.g., nauseous or sick)” | “I often feel painful sensations coming from my heart”  “I often experience painful sensations coming from my chest” | “I often feel like I have difficulties breathing normally”  “I often feel like I can’t get enough oxygen by breathing normally”  **~~“I often feel like I don’t have currently difficulties answering honestly”~~** | "I often feel pain in my stomach" | “My genital organs are very sensitive to pleasant stimulations”  “My genital organs are very sensitive to painful stimulations” | "My skin is very sensitive to painful stimulations (e.g., pinching)"  "My skin is very sensitive to pleasant stimulations (e.g., caressing)"  “Changes in temperature (e.g., feeling feverish or cold) are the first things I notice when I am becoming ill” | “I often experience a pleasant sensation when relieving myself when urinating or defecating”  “I often experience painful sensations when relieving myself when urinating or defecating”  **“I often experience sensations, and I will answer zero to this question”** |
| **Sensitivity** | **Cognitive:** "I always *know* when I am relaxed"  **Feeling:** "I always *feel in my body* if I am relaxed"  **Embodied - specific:** "My body is in a specific state when I am relaxed"  **Embodied - different:** "Being relaxed is a very different bodily feeling compared to other states (e.g., feeling anxious, sexually aroused, or after exercise)”  "When something important is happening, I can feel it in my body" | "In general, I am very sensitive to changes in my heart rate"  "I often notice changes in my heart rate"  "I can notice even very subtle changes in the way my heart beats"  “I am always very aware of my heartbeats, even when I am calm”  “I only notice my heart when it is thumping in my chest”  “I often try to feel my heart with my hands (e.g., by putting my hand on my chest)”  "When something important is happening, I can immediately feel changes in my heart rate"  “In general, I am very sensitive and attentive to the questions I am currently answering” | "In general, I am very sensitive to changes in my breathing"  "I often notice changes in my breathing"  "I can notice even very subtle changes in my breathing"  “I am always very aware of how I am breathing, even when I am calm”  “I often only notice how I am breathing when it becomes loud”  "When something important is happening, I can immediately feel changes in my breathing" | "In general, I am very sensitive to what my stomach is doing”  "I can notice even very subtle changes in what my stomach is doing"  “I am always very aware of what my stomach is doing, even when I am calm”  "I often check the smell of my own breath"  "I often check the smell of my farts"  "I often pay attention to the noises of my stomach"  **“I am always very aware of the answers I am giving right now”** | "In general, I am very sensitive to changes in my genital organs"  "I can notice even very subtle changes in the state of my genital organs"  “I am always very aware of the state of my genital organs, even when I am calm” | "In general, my skin is very sensitive"  "I can notice even very subtle stimulations to my skin (e.g., very light touches)"  “I can notice even very subtle changes if my skin becomes dry or sweaty”  “I am always very aware if my hands and feet are cold or warm”  "I often check the smell of my armpits"  “I am very prone to having goosebumps”  “My skin is susceptible to itchy fabrics and materials”  “I enjoy the sensations of touching different materials (e.g., soft fabrics, wooden objects, smooth surfaces)” | "In general, I am very sensitive to the way I am defecating"  "In general, I am very sensitive to the way I am urinating"  "I often check the colour of my urine"  "I often check the colour of my faeces" |
| **Accuracy** | “I can always accurately feel when I am about to cough”  “I can always accurately feel when I am about to sneeze”  “I can always accurately feel when I am about to vomit”  “I can always accurately feel when I am starting to be hungry”  “I can always accurately feel when I am starting to be thirsty”  **~~"I can always accurately feel when I am answering questions in a study"~~**  **~~“I can always accurately answer to the left to this question to show that I am reading it”~~** | “I can always accurately feel if my heart rate is slow or fast”  “I sometimes feel like my heart is racing or beating faster than usual, but when I check my pulse, it is not as intense as I thought” | “I can always accurately feel how I am breathing (e.g., fast or slow, deep or shallow)”  **“I can always accurately answer to the left on this question to show that I am reading it”** | “I can always accurately feel when I am about to fart”  “I can always accurately feel when I am about to burp”  “I often feel thirsty even if I drank recently”  “I don’t always feel the need to drink until I am really thirsty”  “I often feel hungry even if I ate recently”  “I don’t always feel the need to eat until I am really hungry”  “I often sneeze suddenly without expecting it to happen”  “I often sneeze suddenly without feeling the need building up”  “I sometimes feel that burping will produce some relief but then it doesn’t” | “I can always accurately perceive if my genital organs are in a state of arousal (e.g., hard, wet, pulsating)”  “I sometimes feel like I am sexually aroused, but when I try to satisfy the feeling, I realise that I am not as sexually aroused as I initially thought”  **“I can always accurately perceive that to this question I should answer the lowest option”** | “I can always accurately feel when something is going to be itchy”  “I can always accurately feel when I start to have a fever”  “When something touches my skin, I can always accurately feel if it’s hot or cold”  “I sometimes feel my skin itching, but when I scratch it, it doesn’t produce the relief I expected” | “I often feel the need to urinate even when my bladder is not full”  “I don’t always feel the need to urinate until my bladder is very full”  "I often feel the need to defecate even when my intestine is not full"  "I don't always feel the need to defecate until my intestine is very full"  “I sometimes feel like I need to urinate or defecate but when I go to the toilet, I relieve myself less than I expected” |
| **Confusion** | “Sometimes I can’t tell if the sensations in my body are good or bad”  “Sometimes I am confused about when sensations in my body mean” | “Sometimes my heart starts racing and I often don’t know why” | “Sometimes my breathing becomes erratic or shallow and I often don’t know why” | “Sometimes I feel negative and realise after eating that I was just hungry”  “Sometimes I don’t realise I was hungry until I ate something” | “Sometimes I notice arousal in my genital area (e.g., stiffness, wetness) when I am not feeling sexually aroused) | “Sometimes I have sensations on my skins (e.g., itches, goosebumps) without any clear cause” | “Sometimes I am not sure whether I need to go to the toilet or not (to urinate or defecate)” |
| **~~Beliefs~~** | ~~…~~ | ~~I think that listening to my heart beats helps me understand the world.~~ | ~~…~~ |  |  |  |  |

# **Version 3 - after Giulia**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **General State** | **Cardiac** | **Respiratory** | **Gastric** | **Genital** | **Skin & Thermoregulation** | **Colon & Bladder** |
| **Positive Arousal (Sexual)** | **Cognitive:** "I always *know* when I am sexually aroused"  **Feeling:** "I always *feel in my body* if I am sexually aroused"  **Embodied - specific:** "My body is **always in the same specific** state when I am sexually aroused"  **Embodied - different:** "Being sexually aroused **is** a very different bodily feeling compared to other states (e.g., feeling anxious, relaxed, or **after exercise**)"  **“I always know that I am attentively doing a study”** | “When I am sexually aroused, I feel changes in the way my heart beats (e.g., faster or stronger)” | "When I am sexually aroused, I feel changes in **my breathing** (e.g., faster, shallower, or less regular)" | "When I am sexually aroused, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)" | "When I am sexually aroused, I notice specific sensations in my genital area (e.g., tingling, warmth, wetness, **pulsating**)" | "When I am sexually aroused, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am sexually aroused, I feel like some areas of my skin become sweaty (e.g., palms, back, **forehead**)"  "When I am sexually aroused, I feel my mouth becoming dry" | "When I am sexually aroused, I feel like I need to relieve myself (e.g., by urinating or **defecating**)" |
| **Negative Arousal (Anxious)** | **Cognitive:** "I always *know* when I am anxious"  **Feeling:** "I always *feel in my body* if I am anxious"  **Embodied - specific:** "My body **always in the same specific** state when I am anxious"  **Embodied - different:** "Being anxious corresponds to a very different bodily feeling compared to other states (e.g., feeling sexually aroused, relaxed or **after exercise**)" | “When I am anxious, I feel changes in the way my heart beats (e.g., faster or stronger)” | "When I am anxious, I feel changes **my breathing** (e.g., faster, shallower, or less regular)" | "When I am anxious, I feel changes in my stomach (e.g., bloating, rumbling, discomfort)" | "When I am anxious, I notice specific sensations in my genital area (e.g., contracting, dryness, **pulsating**)" | "When I am anxious, I feel changes in my temperature (e.g., feeling warm or cold)"  "When I am anxious, I feel like some areas of my skin become sweaty (e.g., palms, back)"  "When I am anxious, I feel my mouth becoming dry”  “**When I am anxious, I feel difficulty swallowing.”**  **“Even if I am anxious, I should now answer all the way to the left”** | "When I am anxious, I feel like I need to relieve myself (e.g., by urinating, **defecating**)" |
| **Nociception, Pleasure** | "I always *feel in my body* if I am ill"  “I can easily tell when I am feeling ill (e.g., nauseous or sick)” | “I often feel painful sensations coming from my heart” | “I often feel like I have difficulties breathing normally” | "I often feel pain in my stomach" | “My genital organs are very sensitive to pleasant stimulations”  “My genital organs are very sensitive to painful stimulations” | "My skin is very sensitive to painful stimulations (e.g., pinching)"  "My skin is very sensitive to pleasant stimulations (e.g., caressing)"  **“Changes in temperature are the first thing I notice when I'm ill.”** | “I often experience a pleasant sensation when relieving myself (e.g., when urinating, **defecating**)”  “I often experience painful sensations when relieving myself (e.g., when urinating, **defecating**)”  **“I often experience sensations, and I will answer zero to this question”** |
| **Sensitivity** | **Cognitive:** "I always *know* when I am relaxed"  **Feeling:** "I always *feel in my body* if I am relaxed"  **Embodied - specific:** "My body is **always in the same specific** state when I am relaxed"  **Embodied - different:** "Being relaxed corresponds to a very different bodily feeling compared to other states (e.g., feeling anxious, sexually aroused **after exercise**)”  "When something important is happening, I can feel it in my body" | "In general, I am very sensitive to changes in my heart rate"  "I often notice changes in my heart rate"  "I can notice even very subtle changes in the way my heart beats"  “I am always very aware of my heartbeats, even when I am calm”  “I only notice my heart when it is thumping in my chest”  “I often try to feel my heart with my hands (e.g., by putting my hand on my chest)”  "When something important is happening, I can immediately feel changes in my heart rate"  “In general, I am very sensitive and attentive to the questions I am currently answering” | "In general, I am very sensitive to changes in **my breathing** "  "I often notice changes in **my breathing** "  "I can notice even very subtle changes in **my breathing** "  “I am always very aware of how I am breathing, even when I am calm”  “I often only notice how I am breathing when I am breathing **is irregular**”  "When something important is happening, I can immediately feel changes in **my breathing** " | "In general, I am very sensitive to what my stomach is doing”  "I can notice even very subtle changes in what my stomach is doing"  “I am always very aware of what my stomach is doing, even when I am calm”  "I often check the smell of my own breath"  "I often check the smell of my farts"  "I often pay attention to the noises of my stomach"  **“I am always very aware of the answers I am giving right now”** | "In general, I am very sensitive to changes in my genital organs"  "I can notice even very subtle changes in the state of my genital organs"  “I am always very aware of the state of my genital organs, even when I am calm” | "In general, my skin is very sensitive"  "I can notice even very subtle stimulations to my skin (e.g., very light touches)"  “I can notice even very subtle changes if my skin becomes dry or sweaty”  “I am always very aware if my hands and feet are cold or warm”  "I often check the smell of my armpits"  **“My skin is very sensitive to different fabrics”**  **“I often have goosebumps”** | "In general, I am very sensitive to the way I am defecating"  "In general, I am very sensitive to the way I am urinating"  "I often check the colour of my urine"  "I often check the colour of my faeces" |
| **Accuracy** | “I can always accurately feel when I am about to cough”  “I can always accurately feel when I am about to sneeze”  “I can always accurately feel when I am about to vomit”  “I can always accurately feel when I am starting to be hungry”  “I can always accurately feel when I am starting to be thirsty” | “I can always accurately feel if my heart rate is slow or fast” | “I can always accurately feel how I am breathing (e.g., fast or slow, deep or shallow)”  **“I can always accurately answer to the left on this question to show that I am reading it”** | “I can always accurately feel when I am about to fart”  “I can always accurately feel when I am about to burp”  “I often feel thirsty even if I drank recently”  “I don’t always feel the need to drink until I am really thirsty”  “I often feel hungry even if I ate recently”  “I don’t always feel the need to eat until I am really hungry” | “I can always accurately perceive if my genital organs are in a state of arousal (e.g., hard, wet, **pulsating**)”  **“I can always accurately perceive that to this question I should answer the lowest option”** | “I can always accurately feel when something is going to be itchy”  “I can always accurately feel when I start to have a fever”  “When something touches my skin, I can always accurately feel if it’s hot or cold” | “I often feel the need to urinate even when my bladder is not full”  “I don’t always feel the need to urinate until my bladder is very full”  "I often feel the need to defecate even when my intestine is not full"  "I don't always feel the need to defecate until my intestine is very full" |