JVR PSYCHOMETRICS

Brain Sense™

SWAP™

SENSORY WORKSTYLE ASSESSMENT PROFILE

TECHNICAL MANUAL

Sensory Workstyle Assessment Profile (SWAP)

Technical Manual

Sensory Workstyle Assessment Profile (SWAP™) Technical Manual 1st Edition

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1. INTRODUCTION

1.1 SWAP – Opportunity

The Covid-19 pandemic and global repercussions thereof changed the world of work, and the future of work, indefinitely. Since remote work was implemented for the majority of previously office-bound workers in March 2020, employees have been adjusting to new workplace realities.

Some individuals (73%) thrived and preferred continued flexibility; others (67%) made it clear they need in-person contact, according to Microsoft's (2021) Work Trend Index annual report.

Although the complexity and multidimensionality of these differing responses must be acknowledged - the questions remain, why are we seeing varied reactions amongst employees? How do we make sense of this? Could answers to these questions help us support, empower, and optimise organisational talent? Especially also considering the great resignation/great reshuffling following the pandemic (40% of employees in the US considering leaving their places of employment) as well as what is referred to as the "parallel pandemic": Mental Illhealth. According to the *4th Publication of Workforce Attitudes*, employees are "exhausted and in need of support", while "81% of global employees agree that employers have a responsibility to assist in managing mental health" (Headspace Health, 2022). The workplace has become more than just a place to work.

The relevance and opportunity presented by the SWAP lie within the significance of the sensory brain. The sensory brain is where sensory overload - a fight/flight/fright response - and therefore dysregulation and burnout is initially triggered. Considering Covid-19 uncertainties, global unrest, political instability, as well as unique economic challenges, it is of little wonder that employees are exhausted, with low levels of resilience. Uniquely tailor made 1) Sensory Strategies and 2) Environmental Adaptations to regulate the sensory brain are crucial to healthy and high-performing employees.

1.2 Why the SWAP?

The Covid-19 pandemic necessitated the development of a streamlined and focused Sensory Workstyle Assessment. The SWAP focuses on how employees experience remote, hybrid, or in-office work environments, and how conducive these environments are to 1) wellbeing and 2) productivity. Certain individuals thrived in the remote work scenario, while others' productivity levels and feelings of general wellbeing plummeted. Determining Sensory Workstyles and preferred work environments will help shape the future of work, with sensory smart scientific design of work environments and development of flexible work solutions for optimal collaboration within teams. Empathy and trust will be facilitated within a sensory neurodiverse workforce. According to Headspace Health's (2022) Workforce Attitudes report, employees are in need of "employers that

make an effort to know them". The Covid-19 pandemic made work more human, with a "shared vulnerability which lead to authenticity" (Microsoft, 2021). Leading with empathy, is one of the benefits of the SWAP.

2. SCIENTIFIC VALUE OF THE SWAP

2.1 Preliminary Questionnaire Design

The initial research questionnaire used with the pilot sample comprised 110 items. Internal consistency reliability and exploratory factor analyses conducted on these items identified 19 items that did not fit in with the rest of the items on each scale, either because the item required reverse-scoring while the majority of the items of the scale were not reversed, the item did not contribute significantly to the scale (meaning that the reliability coefficients increased if the item was removed from the scale), or that the item did not significantly load onto the factor (or scale). Given the size of the preliminary sample, differences between gender or ethnic groups were not considered in the decision to remove these items. The final version of the SWAP is therefore 91 items long, and the analyses that follow are based on this 91-item version of the questionnaire. Unless stipulated otherwise, we conducted all analyses in jamovi version 2.3 (The jamovi project, 2022).

2.2 Sample Description

After data cleaning, the sample comprised 249 participants with a mean age of 44.8 (*SD* = 13.1, Median = 45, Min = 18, Max = 93). **Table 1** provides additional sample characteristics.

Table 1. *Sample Characteristics*

Gender	***n***	**%**
Female	169	67.9%
Male	79	31.7%
Other	1	0.4%
Ethnicity	***n***	**%**
Asian/Indian	15	6%
Black African	25	10%
White	189	75.9%
Coloured	20	8%
Country of residence	***n***	**%**
South Africa	236	94.8%
Other [a]	13	5.2%
Impairments	***n***	**%**
None	244	98%
Hearing impairment	4	1.6%
Visual impairment	1	0.4%
Job stressfulness	***n***	**%**
1 (Rarely stressful)	14	5.7%
2	43	17.6%
3	85	34.8%
4	74	30.3%
5 (Extremely stressful)	28	11.5%

Note. [a] Includes participants from Australia, Botswana, England, France, Italy, Namibia, Nigeria, the Netherlands, and the United States of America.

2.3 Descriptive Statistics

Table 2 provides descriptive statistics for each of the SWAP's scales.

Table 2. *Descriptive statistics for the SWAP scales*

Scale	**Mean**	**SD**	**Median**	**Min**	**Max**	**Skewness**	**Kurtosis**	**SE**
Auditory	41.10	8.39	41	16	61	0.04	-0.10	0.53
Movement	39.28	6.69	39	20	60	0.25	0.05	0.42
Smell	39.02	6.93	38	20	55	0.06	-0.31	0.44
Taste	31.43	7.43	31	14	53	0.37	-0.17	0.47
Touch	36.55	6.32	36	22	53	0.05	-0.11	0.40
Visual	45.53	7.10	46	23	64	-0.15	0.48	0.45
Workstyle	47.74	7.18	48	26	70	-0.10	0.27	0.46

Note. SD = Standard deviation, Min = Minimum value, Max = Maximum value, SE = Standard error.

Regarding univariate normality, the skewness and kurtosis values fell within acceptable ranges (-2 to 2; Koh, 2014). This suggests that each variable's distribution was reasonably symmetric and that the distribution's tails were not excessively heavy, or light compared to a normal distribution.

2.4 Correlations

Table 3 provides the Pearson correlation coefficients for the seven SWAP scales. With some exceptions, the correlations predominantly had medium to large effect sizes (Cohen, 1988). This confirmed that the scales were mostly related, yet unique. The standardised inter-factor correlations are provided later.

Table 3. *Pearson correlation coefficients for the SWAP scales*

Scale	Auditory	Movement	Smell	Taste	Touch	Visual
Auditory	-					
Movement	0.03	-				
Smell	0.46	0.07	-			
Taste	0.33	-0.05	0.35	-		
Touch	0.62	0.11	0.50	0.39	-	
Visual	0.68	0.10	0.42	0.32	0.66	-
Workstyle	-0.40	0.25	-0.05	-0.20	-0.24	-0.33

2.5 Item-rest Correlations

Item-rest correlations were calculated to see how well individual items correlated with the sum of the remaining items in the scale. **Table 4** reports these results.

Table 4. *Item-rest correlations for the SWAP scales*

Auditory		Movement		Smell		Taste		Touch		Visual		Workstyle	
#	Cor	#	Cor	#	Cor	#	Cor	#	Cor	#	Cor	#	Cor
4	0.63	16	0.36	8	0.50	17	0.50	24	0.50	6	**0.17**	2	0.44
7	0.57	35	**-0.01**	9	0.54	20	0.48	32	0.25	11	0.48	3R	**0.11**
12	0.54	36	0.44	19	0.51	22	0.40	39	**0.16**	21	0.43	10	0.54
15	0.52	53	0.55	26	0.34	25	0.72	43	0.36	23	0.44	18	0.44
29R	**-0.00**	56	0.25	42	0.65	52	**0.05**	47	0.40	28	0.25	27	**0.04**
33	0.51	57	0.37	44	0.48	58R	0.59	48	0.36	40	0.43	37	0.52
63	**0.18**	60	0.40	50	0.25	68	0.61	67	0.45	54	**0.03**	46R	0.44
70	0.51	64	**0.13**	76	0.47	75R	0.28	95	0.32	55	0.23	49	0.51
73	0.64	74	0.35	78	0.64	92	0.30	96	0.46	65	0.30	51	0.33
83	0.56	81	**0.17**	80	0.62	97	0.59	102	0.22	69	0.30	62	0.44
93	0.55	82	0.42	90	0.50	101	0.39	107	0.27	72	0.35	71R	**0.15**
98	0.59	87	0.44	103	0.29	106	0.61			79	0.43	77	0.43
100	0.75	91	0.44							89	0.48	84R	0.23
		104	**0.14**							105	0.22	94	0.57
												99	0.58

Note. # = Item number on the scale, Cor = item-rest correlation value. Item-rest correlations < 0.20 are indicated in bold.

When an item-rest correlation value falls beneath a certain threshold (e.g., 0.20; Zijlmans et al., 2018), it indicates that the individual item associated with this value might not tap into the construct to the same extent as the remaining items in the scale.

As per **Table 4**, several items had item-rest correlations lower than 0.20. The mean item-rest correlations for the scales however exceeded 0.20: Auditory (0.55), Movement (0.32), Smell (0.48), Taste (0.46), Touch (0.34), Visual (0.32), and Workstyle (0.38).

2.6 Reliability

We calculated Cronbach's alpha (α) and McDonald's omega (ω) to evaluate the scales' reliability. **Table 5** reports these results.

Table 5. *Reliability coefficients of the SWAP scales*

Scale	Cronbach's α	McDonald's ω
Auditory	0.84	0.86
Movement	0.70	0.72
Smell	0.82	0.84
Taste	0.81	0.82
Touch	0.68	0.71
Visual	0.72	0.72
Workstyle	0.77	0.79

Note. Cronbach's α = Cronbach's alpha, McDonald's ω = McDonald's omega.

As per **Table 5**, the reliability coefficients ranged from 0.68 to 0.86. In the preliminary stages of test development, like in the SWAP's case, modest reliability values (α and/or ω = 0.70) are deemed adequate for developmental purposes.

2.7 Confirmatory Factor Analysis

Several models were tested to determine which factor structure best represents the SWAP. These included a correlated seven-factor model (Model 1), a one-factor model (Model 2), and a correlated five-factor model where the Auditory, Touch, and Visual scales were consolidated (Model 3) because of high inter-factor correlations: Touch-Auditory (0.85), Visual-Auditory (0.93), and Visual-Touch (0.97)[1]. Each model's performance was assessed through the following commonly reported fit metrics: comparative fit index (CFI), Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), the standardised root mean square residual (SRMR), Akaike information criterion (AIC), and the Bayesian information criterion (BIC). Values close to 0.95 (CFI and TLI), 0.06 (RMSEA), and 0.08 (SRMR) generally indicate good model fit (Hu & Bentler, 1999). Although no cut-off values are used to assess AIC and BIC, lower values typically signal better model fit. Full information maximum likelihood (FIML) was used to deal with missing data points. **Table 6** presents the results of the specified models.

[1] These inter-factor correlation values were derived from Model 1's results.

Table 6. *Model fit statistics*

Model	χ^2	*df*	CFI	TLI	SRMR	RMSEA	AIC	BIC
Model 1	7739	3983	0.547	0.535	0.094	0.062 [0.060, 0.064]	63643	64677
Model 2	9394	4004	0.350	0.336	0.096	0.074 [0.072, 0.076]	65256	66216
Model 3	7820	3994	0.539	0.527	0.094	0.062 [0.060, 0.064]	63703	64698

Note. χ^2 = Chi-square, *df* = Degrees of freedom, CFI = Comparative Fit Index, TLI = Tucker-Lewis index, SRMR = Standardised Root Mean Square Residual, RMSEA = Root Mean Square Error of Approximation with 90% confidence intervals, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion.

As per **Table 6**, Model 1 (the correlated seven-factor model) fitted better than the other models as indicated by higher CFI and TLI values and lower or similar SRMR, RMSEA, AIC, and BIC values. Model 1, however, did not achieve CFI, TLI, SRMR, and RMSEA values that generally indicate good model fit (e.g., Hu & Bentler, 1999). As certain *R* (R Core Team, 2023) packages offer additional model fit information (e.g., robust fit statistics), we used the *cfa* function from the *jmv* (Selker et al., 2023) package to extract the correct syntax to re-run Model 1 in *R*. The *cfa* function from the *lavaan* (Rosseel, 2012) package was used for this purpose. Results showed that the robust statistics differed somewhat from those reported in **Table 6**: CFI = 0.547 vs. 0.557, TLI = 0.535 vs. 0.544, and RMSEA = 0.062 vs. 0.060. The robust CFI and TLI values were still not ideal. Therefore, to determine the informativeness of the preceding incremental fit measures we looked at the RMSEA value of the null model, using the *nullRMSEA* function from the *semTools* (Jorgensen et al., 2022) package. Kenny (2020) suggests "If the RMSEA for the null model is less than 0.158, an incremental measure of fit may not be that informative" (See last paragraph of Comparative Fit Index (CFI) section). Kenny (2020) further notes that "the CFI should not be computed if the RMSEA of the null model is less than 0.158 or otherwise one will obtain too small a value of the CFI" (See last paragraph of Tucker-Lewis index or Non-normed Fit Index (NNFI) section). Consequently, a null model RMSEA value of 0.09 indicated that the CFI and TLI should not be interpreted. Furthermore, it should be noted that the model parameters exceeded the sample size, which might have led to unreliable estimates. For example, in small samples, Shi et al. (2019) suggest that RMSEA values tend to be upwardly biased (i.e., biased in terms of its values being higher), whereas TLI and CFI values tend to be downwardly biased (i.e., biased in terms of its values being lower). This is problematic, as higher TLI and CFI values and lower RMSEA values are desirable. Furthermore, Shi et al. (2019) note that when a model has roughly 90 observed indicators (items) and their respective factor loadings vary around 0.40, a sample size exceeding 1000 may be necessary to interpret CFI and TLI indices with greater confidence. Hence, seeing that the SWAP currently has 91 items and an average item factor loading of 0.45, a larger sample size is required to increase the accuracy of model fit inferences. Therefore, until more data are gathered, model fit statistics should be cautiously interpreted.

In addition to model fit statistics, Model 1's standardised inter-factor correlations were assessed. **Table 7** reports these results.

Table 7. *Standardised inter-factor correlations*

Scale	Auditory	Movement	Smell	Taste	Touch	Visual
Auditory	-					
Movement	0.13	-				
Smell	0.55	0.18	-			
Taste	0.36	0.11	0.28	-		
Touch	0.85	0.30	0.69	0.48	-	
Visual	0.93	0.38	0.57	0.44	0.97	-
Workstyle	-0.32	0.09	-0.02	-0.27	-0.30	-0.37

As per **Table 7**, high inter-factor correlations were established between some scales (e.g., Touch-Auditory = 0.85, Visual-Auditory = 0.93, and Visual-Touch = 0.97). Consequently, the distinctness of these scales should be closely monitored in future research.

Furthermore, apart from model fit statistics and inter-factor correlations, Model 1's factor loadings were inspected to see how the items loaded onto their intended scales. **Table 8** reports these results.

Table 8. *Standardised and unstandardised item factor loadings*

Scale/Item	Estimate	SE	Z	*p*	Std. Estimate
Auditory					
4	0.645	0.06	11.51	< 0.001	0.673
7	0.692	0.07	10.22	< 0.001	0.610
12	0.672	0.07	9.53	< 0.001	0.575
15	0.589	0.07	8.73	< 0.001	0.535
29R	0.052	0.08	0.63	**0.529**	0.042
33	0.565	0.06	9.21	< 0.001	0.559
63	0.262	0.08	3.14	0.002	0.206
70	0.626	0.07	9.59	< 0.001	0.586
73	0.773	0.06	12.73	< 0.001	0.724
83	0.633	0.06	10.36	< 0.001	0.616
93	0.698	0.07	10.38	< 0.001	0.619
98	0.718	0.07	10.92	< 0.001	0.642
100	0.835	0.06	15.15	< 0.001	0.814
Movement					
16	0.437	0.08	5.33	< 0.001	0.369
35	0.068	0.08	0.85	**0.397**	0.060
36	0.558	0.06	9.60	< 0.001	0.614
53	0.841	0.07	11.87	< 0.001	0.740
56	0.269	0.08	3.32	0.001	0.233
57	0.545	0.08	7.01	< 0.001	0.471
60	0.365	0.07	5.23	< 0.001	0.369
64	0.115	0.08	1.52	**0.128**	0.111
74	0.495	0.09	5.72	< 0.001	0.392
81	0.144	0.06	2.25	0.025	0.163
82	0.477	0.07	7.02	< 0.001	0.477
87	0.681	0.08	8.55	< 0.001	0.555
91	0.629	0.07	9.19	< 0.001	0.594
104	0.237	0.08	2.80	0.005	0.197

Smell					
8	0.672	0.08	8.57	< 0.001	0.538
9	0.645	0.07	9.19	< 0.001	0.571
19	0.744	0.07	11.43	< 0.001	0.674
26	0.322	0.08	4.23	< 0.001	0.281
42	0.825	0.06	14.03	< 0.001	0.781
44	0.626	0.07	8.66	< 0.001	0.538
50	0.225	0.08	2.66	0.008	0.179
76	0.531	0.07	7.89	< 0.001	0.498
78	0.804	0.06	13.76	< 0.001	0.771
80	0.707	0.06	12.39	< 0.001	0.717
90	0.598	0.08	7.77	< 0.001	0.491
103	0.322	0.08	4.01	< 0.001	0.266
Taste					
17	0.582	0.07	7.80	< 0.001	0.494
20	0.537	0.07	7.41	< 0.001	0.472
22	0.450	0.07	6.33	< 0.001	0.409
25	0.972	0.06	16.53	< 0.001	0.872
52	0.074	0.07	1.04	**0.296**	0.070
58R	0.842	0.06	13.61	< 0.001	0.766
68	0.695	0.06	11.19	< 0.001	0.662
75R	0.377	0.07	5.44	< 0.001	0.354
92	0.362	0.07	5.40	< 0.001	0.350
97	0.678	0.06	11.97	< 0.001	0.695
101	0.473	0.09	5.36	< 0.001	0.352
106	0.615	0.06	9.72	< 0.001	0.596
Touch					
24	0.582	0.07	8.19	< 0.001	0.518
32	0.331	0.09	3.74	< 0.001	0.250
39	0.145	0.08	1.81	**0.070**	0.122
43	0.661	0.08	7.98	< 0.001	0.500
47	0.516	0.06	8.25	< 0.001	0.515
48	0.573	0.07	8.53	< 0.001	0.535
67	0.807	0.07	11.39	< 0.001	0.673
95	0.445	0.09	5.10	< 0.001	0.336
96	0.399	0.05	7.66	< 0.001	0.488
102	0.194	0.09	2.20	0.028	0.148
107	0.319	0.07	4.60	< 0.001	0.302
Visual					
6	0.330	0.06	5.34	< 0.001	0.343
11	0.352	0.08	4.52	< 0.001	0.295
21	0.484	0.07	7.07	< 0.001	0.443
23	0.494	0.08	5.93	< 0.001	0.382
28	0.070	0.07	1.00	**0.318**	0.066
40	0.773	0.06	12.11	< 0.001	0.692
54	-0.004	0.05	-0.07	**0.948**	-0.004
55	0.120	0.07	1.82	**0.069**	0.123
65	0.424	0.07	6.14	< 0.001	0.393
69	0.501	0.07	7.08	< 0.001	0.441
72	0.287	0.07	4.05	< 0.001	0.263
79	0.567	0.06	8.92	< 0.001	0.542

89	0.820	0.07	11.67	< 0.001	0.676
105	0.299	0.07	4.26	< 0.001	0.275
Workstyle					
2	0.441	0.07	6.59	< 0.001	0.431
3R	0.041	0.06	0.68	**0.497**	0.047
10	0.467	0.04	10.49	< 0.001	0.638
18	0.533	0.07	7.79	< 0.001	0.499
27	0.009	0.06	0.14	**0.887**	0.010
37	0.658	0.06	10.69	< 0.001	0.647
46R	0.456	0.06	7.38	< 0.001	0.476
49	0.550	0.07	7.47	< 0.001	0.482
51	0.373	0.06	5.78	< 0.001	0.383
62	0.412	0.05	7.89	< 0.001	0.504
71R	0.157	0.09	1.82	**0.068**	0.125
77	0.590	0.08	7.76	< 0.001	0.500
84R	0.271	0.07	3.70	< 0.001	0.254
94	0.626	0.05	12.89	< 0.001	0.747
99	0.588	0.05	12.68	< 0.001	0.738

Note. Estimate = Unstandardised factor loading, SE = Standard error, Z = *z*-score, *p* = p-value, Std. Estimate = Standardised factor loading. *p*-values > 0.05 are indicated in bold.

As per **Table 8**, some items had statistically significant factor loadings on their intended scales, whereas others did not. Item factor loadings of at least 0.30 are often regarded as the minimal amount needed to adequately load onto a factor (e.g., Spector, 1992). The standardised item factor loadings for the scales varied as follows: Auditory (0.04 to 0.81, Mean = 0.55), Movement (0.06 to 0.74, Mean = 0.38), Smell (0.18 to 0.78, Mean = 0.53), Taste (0.07 to 0.87, Mean = 0.51), Touch (0.12 to 0.67, Mean = 0.40), Visual (-0.004 to 0.69, Mean = 0.35), and Workstyle (0.01 to 0.75, Mean = 0.43). Consequently, certain items negatively influenced (i.e., lowered) the respective scales' mean factor loadings.

In summary, confirmatory factor analytic results showed that more research is needed to see if similar results can be found in other samples. Additionally, larger samples would also allow one to interpret the model fit statistics more confidently.

3. THEORETICAL FRAMEWORK

3.1 What is Sensory Integration

Sensory integration is the process well described in Ayres Sensory Integration Theory, 1964+ (Bundy, et al., 2002). Jean Ayres was an Occupational Therapist who defined Sensory Integration as: *"The neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment"* (Bundy et al., 2002). The purpose and aim of the SWAP are to assist employees in functioning effectively, healthily, and productively within the work environment, be it remotely, hybrid, or in-office.

Sensory Integration is the umbrella term for two processes: Sensory Discrimination and Sensory Modulation. These constructs are widely used in the field of Clinical Occupational Therapy, mostly in adult and adolescent mental health, and the paediatric field of Occupational Therapy (Bundy et al., 2002).

3.2 Sensory Discrimination

Sensory Discrimination is the process of accurately discriminating and distinguishing sensory stimuli. The ability to accurately discriminate sensory stimuli from the environment as well as internal body organs, results in functional skills development. Accurate Sensory Discrimination is one of the main treatment goals within the field of paediatric occupational therapy. Assisting children to effectively register, orientate, and apply sensory messages enable them to respond functionally within their environments. Sensory Integration is a powerful treatment tool for the development of skills such as healthy muscle tone, postural control, bilateral integration, fine and gross motor coordination, motor planning, reading, writing, etc. Sensory Discrimination is not assessed by the Sensory Workstyle Assessment Profile (SWAP) and falls outside the scope and purpose of this wellbeing and productivity tool.

3.3 Sensory Modulation

Sensory Modulation refers to behavioural and psychological responses to sensations. Dr Jean Ayres defined modulation as the "central nervous system's regulation of its own activity". This is the ability to regulate the brain's activity in such a way that responses to sensations are functional, helpful, and effective (Bundy et al., 2002).

Healthy and typically developed adults all on occasion over- or underreact to sensory messages. The process of Sensory Modulation is unconscious, intuitive, and uncontrolled. It is a knee-jerk sensory brain response to environments, activities, and people.

Employees are required to respond appropriately to work demands (sensitisation), which means they are able to pay attention to important messages. They are also required to filter out irrelevant stimuli (habituation), to not get distracted and uncomfortable in the workspace.

When an individual overresponds to sensations, over reactivity is observed, e.g., irritability with background noise in an open-plan workspace. If an individual under-responds to environmental stimuli, under-responsivity is observed e.g., a disorganised workspace not being noticed and tidied.

The Sensory Workstyle Assessment Profile (SWAP) determines the typical responses an employee has to sensations received from the work environment as well as internal body organs, and therefore on Sensory Modulation at Work, regardless of where they work from. Sensory Modulation can be referred to as an individual's social, emotional, and behavioural response to stimuli. An appropriate response to work stimuli is crucial to employee and team wellbeing and productivity.

The SWAP will improve insight into one's own internal reaction to external stimuli (internal awareness), as well as of the impact internal dysregulation has on the rest of the team, or the external work environment (external awareness). This process of 'Dual Awareness' is powerful in creating regulated, high-performing and cohesive teams (Brassey et al., 2023).

3.4 Sensory Processing Disorders

In the clinical field of Occupational Therapy, a Sensory Processing Disorder (SPD) is diagnosed when sensory needs interfere with functionality. A clinical diagnosis is made through the use of standardised assessment tools. Should an individual report 1) intense, and 2) frequent interference with daily tasks due to sensory overload or poor registration of sensory stimuli, a Sensory Processing Disorder is diagnosed (Bundy et al., 2002).

The SWAP is not positioned as a diagnostic tool, but a self-awareness and self-management tool for employees and managers in the workplace. Through awareness of differences in sensory preferences, empathy and team cohesion can improve. Psychological safety in the workplace can be established when diversity truly is embraced (Clark, 2023). The SWAP aims to enhance all four (4) pillars of wellbeing - physical, mental, social, and spiritual as well as performance and productivity.

3.5 Sensory Thresholds

On a neuro-anatomical level, sensory thresholds refer to two (2) processes – excitation and inhibition, which are observed in behaviour. When neurons are more likely to respond or activate in response to sensory input, the process is called excitation. When the neuronal response is decreased or activation is blocked, the process is called inhibition. The balance between excitation and inhibition is a central nervous system skill which balances sensory input and allows individuals to respond adaptively and effectively to workspace challenges (Bundy et al., 2002). On a behavioural level, a graded and meaningful response to sensory messages within a particular environment is observed. The aim for use and application of the SWAP is to increase wellness and productivity within the world of work through the self-management of excitation and inhibition (sensory modulation), utilising both practical and easy-to-implement sensory strategies, as well as workplace adaptations.

4. SENSORY SCIENCE IN THE WORKPLACE

4.1 Sensory Wellness at Work

Dr Jean Ayres was a campaigner for the view that the brain has a hierarchical structure, functioning as a coherent and holistic whole. She believed that higher brain structures required to function effectively particularly at work, depended on lower brain regulation, a regulated sensory brain.

Research and sensory integration clinicians have identified over-responsivity, under-responsivity, and fluctuating responses, as clearly observed behaviour patterns. Authors and sensory integration clinicians have suggested that sensory modulation is multidimensional. Neurological sensory thresholds could be observed over a wide continuum, ranging from very high to very low (Bundy et al., 2002).

Sensory Regulation and Sensory Self-management on a lower brain level, allow access to higher cortical skills required in the workplace, such as problem solving, creative thinking, mental agility, negotiation, logical reasoning, and more. According to Ayres, "Individuals who have a decreased ability to process sensation may also have difficulty producing appropriate actions, which in turn, may interfere with learning and behaviour" (Bundy et al., 2002). The ability to learn and behave appropriately at work impacts wellbeing, productivity, and team relationships. This is where the value of the SWAP is of particular interest.

4.2 Over-Responsivity = Low Sensory Thresholds

Over-responsivity to sensory messages may occur in reaction to stimuli, e.g. an individual may be sensitive/over-responsive to touch, and have a particularly large personal space, leaving them uncomfortable in a busy and cramped open-plan office. The individual's response to colleagues invading their large personal space, does not match the actual environmental stimuli, representing an over-reactivity. This may damage work relationships, result in misunderstandings, and even potential conflict amongst team members.

4.3 Under-Responsivity = High Sensory Thresholds

Under-responsivity to sensory messages may occur e.g. an individual may be oblivious to background noise in an open plan workspace, or not notice smells generated from the kitchen. The individual's response to sounds and smells does not match environmental stimuli, representing an under-reactivity. This could in turn result in important verbal instructions being missed, or e.g., overuse of perfume/cologne which may overload colleagues.

4.4 Fluctuating Responses

Fluctuating responses refer to over responsivity to sensory messages some of the time, and under-responsivity at other times. With fluctuating responses to sensations, the environment, particular scenario, people, and tasks are of important relevance: e.g., an individual may be auditory sensitive but still attend and enjoy a rock concert to accompany loved ones. Should the auditory overload occur under different circumstances and with different people, e.g., during a stressful work meeting, an over-responsivity may be observed. Fluctuating and Neutral responses are difficult to distinguish one from the other. The SWAP reports on: Over-Responsivity (Low Sensory Thresholds), Neutral Responses (Medium Sensory Thresholds), and Under-Responsivity (High Sensory Thresholds).

4.5 Neutral Responses

Employees with neutral responses on the SWAP often do not have any particular sensory preference e.g., they work equally well in noisy as well as quiet environments, due to neutral or medium auditory thresholds. They do not over- or under respond to sensory stimulation.

Neutral scores should however be interpreted with caution. If an employee presents with mostly high threshold scores, neutral scores indicate their most sensitive sensory systems, and are therefore prone to overload. If an employee presents with mostly low threshold scores, neutral scores represent their most seeking sensory systems where more stimulation is needed for energy and focus. Clarifying questions will determine whether a true neutral threshold score was achieved, vs. a slightly less sensory seeking, or slightly less sensory sensitive score compared to the rest of their threshold score results.

4.6 The Four Sensory Profiles

The four quadrants of Sensory Modulation's behavioural outcomes as described by Winnie Dunn and Catana Brown referred to two high threshold profiles: 1) Sensory Seeking and 2) Sensory Under-Responsive. There are two low threshold profiles: 1) Sensory Avoidant and 2) Sensory Sensitive (Brown & Dunn, 1999).

Each quadrant represents either an active or passive response to thresholds. When responding actively to thresholds, individuals actively work against their sensory thresholds:

1) When actively trying to add more sensation to the workday, sensory seeking behaviour represents an active response to high thresholds.
2) When actively trying to reduce sensation throughout the workday, sensory avoidant behaviour represents an active response to low thresholds.

When responding passively to thresholds, individuals do not work against their sensory thresholds. They respond in accordance with their thresholds, allowing their sensory system to respond automatically.

1) Employees with a passive response to low sensory thresholds, present with sensory sensitivity, not avoiding sensory input throughout the workday, but feeling exhausted and in overload.

2) Employees with a passive response to high sensory thresholds, respond with poor registration of sensation, not actively seeking more sensory input, but unconscious of sensory input, e.g., missing detail, not registering errors in documents, not registering aircon blowing directly onto the skin, etc. (Brown & Dunn, 1999).

Dunn's sensory profile model combines the neurophysiological functions of sensory thresholds on a cellular level, with the behavioural outcomes (Bundy et al., 2002). Behavioural responses to sensory thresholds impact among others, an employee's preferred workstyle, behaviour patterns, as well as preferred environment, tasks, and colleagues.

The SWAP results do not provide detail regarding an active vs. passive response to sensory stimuli, and focus only on Low, Medium, and High threshold scores for simplification.

4.7 Different Sensory Thresholds; Different Work Needs

Sensory thresholds refer to the intensity and speed at which sensory receptors covering the entire body, register and respond to stimuli. Sensory thresholds differ from individual to individual. Sensory Thresholds form part of our genetic make-up and is an unconscious response. There is no right or wrong, and sensory thresholds do not change significantly over time.

Sensory Modulation can show normal variation within a day in all employees. In employees without a diagnosis of Sensory Processing Disorder, extreme variations and extreme fluctuations between over- and under responsiveness are not likely to be observed.

Some employees require varied, interesting, and sensory rich work environments (high sensory threshold individuals), while others need quiet, contained, and controlled environments (low sensory threshold individuals). It is enlightening and empowering to identify, demystify, and manage sensory threshold needs at work for wellbeing and performance.

Environmental adaptations and sensory strategies to promote wellbeing, productivity, and a sense of scientific employee centered care are provided by the SWAP Report. Employees want more, they need person-centered care as well as motivating environments (Headspace Health, 2022). A once-size-fits-all approach no longer does the trick; this is where the SWAP comes in.

In an article published in Harvard Business Review: "*What Amazing Bosses Do Differently*" (Finkelstein, 2015), the managing of individuals rather than that of a team is highlighted as of crucial importance to employee wellbeing and performance.

5. SENSORY SMART WORKSPACES

At the heart of different sensory thresholds lies individualised workstyles and preferred work environments. The unique way in which we process the environment through our senses, impacts the way we work. Knowledge and awareness around sensory workstyles provide invaluable insight to both employer and employee in the planning of optimal work environments, flexi/hybrid work solutions, as well as wellness and productivity programs.

Determining the Sensory Workstyle Profiles of employees could allow for large or small workplace adaptations to improve productivity and wellbeing. A valuable illustration of this is the environmental adjustments embarked upon by BMW - a motor vehicle manufacturing company, to accommodate an ageing workforce, which resulted in marked increased productivity (Headspace Health, 2022).

Managers are required to "create the conditions in which those they lead choose to be as motivated as circumstances will allow" according to an article published in Harvard Business Review: "*Keeping your Team Motivated when the Company is Struggling*" (Carucci, 2022). Work environments utilising Sensory Informed Design are of crucial relevance to employee wellbeing and productivity, much like "Trauma Informed Design" has taken off in the creation of workspaces that 'heal' (Guhl, 2022). It matters what the office looks like.

5.1 Empowering Employer and Employee

Self-awareness and self-management on an individual level, and people awareness and people management on a leadership level will only become more important in coming years. In amongst such self-awareness and self-management is the critically important, and often missed, factor of individual Sensory Workstyles. This is often not recognised or understood but could play a critical role in understanding and combating digital exhaustion, preserving mental, physical, and social wellbeing, and assisting in prevention of burnout and absenteeism. This will support and even increase productivity and retention of talent. According to Microsoft's (2021) Work Trend Index annual report: "… *employees need to be empowered for extreme flexibility, employers need to invest in space and technology to bridge physical and digital worlds, investment should go toward combatting digital fatigue, and emphasis should be placed on employee experience to retain talent*". The SWAP is uniquely positioned to assist in achieving these goals.

5.2 Future Work Trends

Going forward, even more change is expected in the world of work, and this will continue to have an impact on wellbeing and productivity. Employees need clarification and empowerment for hybrid/flexi work in order to function effectively (Microsoft, 2021). Other work trends could also include among others: smaller office spaces, an ageing workforce, an increase in mental ill health

(referred to as Covid-19's parallel pandemic), the reinvention of the traditional office from "mandate to magnet" (Gartner, 2021), virtual reality work environments, employee centred support, emphasis on diversity and inclusion, as well as the need for stronger workplace connections (Headspace Health, 2022). This is no small task; scientific knowledge around sensory brain needs is needed for a future proof organisation. The 5th Industrial Revolution is predicted to centre around humanity, soft skills, and uniquely human contributions to the workspace; that which AI cannot provide.

5.3 Benefits of the SWAP in the Workplace

Sensory awareness and self-management for the individual employee will assist in establishing preventative wellness strategies, helping to manage behavioural and emotional responses, and increase productivity. Employees are looking for redefining of a company's attraction and retention strategies, and for companies who take their "whole lives into account" (De Smet et al., 2022).

The SWAP can improve **physical wellbeing** as it guides employees regarding visual and auditory overload, the reason behind overeating or a tendency to limit food choices, sustainable exercise routines, how to use the tactile system for self-regulation, utilising smell to calm or energise, and optimal work environment fit, amongst others.

The SWAP can improve **mental wellbeing** as it guides employees to scientific, individualised emotional self-regulation and stress management. It provides insight into low threshold sensory systems resulting in overload, and high threshold sensory systems, where more stimulation is needed for energy and improved mood.

The SWAP's **social wellbeing** benefit facilitates increased empathy, dropping of labels, improved team awareness, and team optimisation regarding workstyle needs and preferences. Trust is established when we talk about something we all have in common, a sensory system with unique thresholds. We are all neurodiverse on a sensory brain level. In a Harvard Business Review article July 2022, it is again reiterated that employees want to feel deeply connected to their company and want to be treated as whole individuals (Barsoux et al., 2022).

The SWAP's impact on **spiritual wellbeing** – having a goal, purpose, and feeling confident about the work we do – is focused on workstyle strengths and optimisation of team collaboration to compliment and support each other. Job crafting according to sensory neurodiverse strengths and challenges is a powerful tool to prevent burnout and sustain productivity (Zucker, 2023).

The SWAP's practical and easy-to-implement sensory strategies and workplace adaptations assist in achieving calm-alert levels of arousal, required for **productivity and performance.** Doctor Ayres' main concern was always to ensure that "individuals act more effectively and efficiently within their environment" (Bundy et al., 2002). To function effectively and efficiently at work is the purpose of the SWAP.

5.4 Sensory Wellness for the General Workforce

Although the focus and research of Sensory Integration theory was originally focused on children with learning difficulties and adults with mental ill health, Ayres stipulated that it *also applies to all adults*, especially if over- or under responsivity was present during childhood (Bundy et al., 2002). Modulation of sensations remains part of an individual's genetic wiring until the day they die,

impacting emotions, behaviour, and concentration. There is no right or wrong response to sensory stimuli; Sensory Modulation is something we all have in common and all experience differently.

Sensory Modulation is a deeply personalised and unique experience and impacts why we prefer certain people, tasks, and work environments over others. This people-centric approach is invaluable as money is no longer the only factor at play in retaining organisational talent. Many truly talented employees are no longer motivated by a pay check alone; they also need to feel seen, understood, and supported. The highest levels of CEO departures in history were recorded from January 2023 through to September 2023, citing burnout and *'overload'* as two of the main reasons (Constantz, 2023). The SWAP will allow employers and managers to truly understand basic, unconscious, sensory brain needs to retain talent and manage overload.

5.5 Low Threshold Employees

Sensory defensiveness is a fight/flight/fright response to sensory stimuli which the majority of the population finds non-threatening. In the typical population we refer to sensory sensitivity instead of sensory defensivity. Sensory sensitivity results in over-reactivity within the work environment, with subsequent distractibility, stress, irritability, fatigue, as well as possible attempts at controlling the environment to prevent overload. Sensory sensitivity is often associated with impairment of limbic and reticular system processing, resulting in increased stress and anxiety (Bundy et al., 2002). Low threshold employees may therefore find work overloading and stressful.

5.6 High Threshold Employees

Under-responsiveness to sensation refers to individuals who under register, and therefore, under react to sensory stimuli from the work environment. They may also present with delayed reactions to sensations (Bundy et al., 2002) or appear oblivious to sensory stimuli, resulting in errors or missed detail. These employees may present as sensory seeking, actively trying to add more sensation to their workday (active response). This may result in boredom, frustration, and distractibility. High threshold employees may find work under-stimulating and boring, and therefore struggle to self-motivate.

6. INDIVIDUAL SENSORY SYSTEMS

6.1 The Visual System

Vision is the most complex of all sensory systems. It is the process of discovering what we see in our environment, and where it is. From light receptors in the retina, visual stimuli travel down the optic nerve, fifty per cent of the fibres cross for binocular vision, and from there it travels to the bottom brain and then the occipital lobe at the back of the brain (Moore, 2023). Vision is one of two information senses, and as result frequently in overload due to digital and overloading workspace realities.

Visual thresholds directly impact the way we work, as the brain subconsciously either over- or under respond to visual stimuli. On a practical level this may include: attention to detail vs. missed detail, accuracy vs. errors, cluttered vs. organised spaces, digital overload vs. visual seeking tendencies, preferences in terms of layout of documents/slides, an eagerness vs. reluctance to sharing open-plan workspaces, distractibility vs. ability to focus, a strong need to continue remote work vs. preference to in-office work, vulnerability to headaches and migraines, deterioration in eyesight, eye irritation, etc.

6.2 The Auditory System

Hearing should fill us with a sense of awe and wonder. It connects us with the world around us and protects us from danger. From the hair cells in the cochlea, sound waves travel to the bottom brain and then to the auditory cortex which forms part of the upper part of the temporal lobe (Moore, 2023). Auditory is also an information sense, and vulnerable to overload due to overstimulation and overuse.

Auditory thresholds directly impact our ability to stay focused vs. distractibility. Low auditory thresholds result in increased stress and poor performance in an overloading environment. Auditory scores provide information around potential overload, open-plan office distractions, preferences regarding remote work vs. in-office work, irritation vs. oblivion to the sound of office equipment, traffic, chatter, etc. The need for simple workspace adaptations such as noise absorbing acoustics, quiet cubicles, headphones, hybrid work solutions, etc. will be clarified. Auditory thresholds impact preferences regarding tones or pitch of voice, ring tones, and seating at work.

In an article published in Harvard Business Review, Berinato (2022) refers to a study conducted by Edmans et al. (2022) that analysed data on "*The average positivity of songs that people in 40 nations listened to on Spotify*". The researchers compared data with the performance of each country's stock market over the same period. The conclusion: When people listen to happy songs, the market outperforms" (Berinato, 2022). Music can energise or calm for work performance and wellbeing.

6.3 The Tactile System

Touch is our first language, and the first sensory system to function in utero, crucial to emotional and social development. It is for connection, protection, and communication. Touch receptors in the skin cover the entire body. Neurons carry touch stimuli to the bottom brain and then the sensory cortex in the parietal lobe (Moore, 2023). Touch is one of our three social senses. There are two touch pathways, the spinothalamic column relaying light touch, pain, and temperature (activating/alerting) and the dorsal column relaying firm touch, deep pressure, and vibration (inhibiting/calming). An employee could be seeking of dorsal column input and avoiding of spinothalamic touch input.

Following the Covid-19 pandemic, tactile sensitive employees were particularly reluctant to return to the office and understandably stringent around health and safety protocols. Differing tactile thresholds may result in misunderstandings and conflict. Sensitive tactile employees prefer lower office density, while tactile seekers are typically more comfortable with closer proximity. Knowledge and awareness provided by the SWAP is key.

A lack of touch input during Covid-19 lockdown and subsequent feelings of isolation, being overlooked, disregarded, etc., for employees with a high touch score will be clarified. Irritation with hygiene practices, untidy kitchenettes, etc. will be explained for touch sensitive individuals, as well as the need to fidget with stationery etc., while trying to stay focused, amongst others. A strong need to continue remote work due to touch thresholds is invaluable insight for managers designing flexible work solutions. Tactile sensitivity is associated with distractibility, discomfort, and often increased levels of activity (Bundy et al., 2002). Tactile thresholds impact work performance and stress levels.

6.4 The Smell System

Smell receptors are situated in the soft palate at the back of the nose and relays smell directly to the primary olfactory cortex in the midbrain (Moore, 2023). The olfactory cortex lies near the hippocampus, involved with memory, learning, and emotions. Smells transport us to places, people, and memories within milliseconds. Smell is one of our social senses.

Employees with sensitive smell thresholds may prefer sitting away from office smells generated by the canteen, washrooms, or fellow colleagues. Sensitivity and reactivity to body odours, colleagues' breath, the over- or under-use of perfume, social preferences, etc., will be ironed out. If for example a smell sensitive employee commutes to work with a smell seeking colleague overusing perfume or cologne, overload may result in headaches, nausea, and social misunderstandings, even though this does not occur on a relationship level.

The use of personalised alerting or calming workspace smells (when in own space) to stimulate the hippocampus of the brain for optimal learning, memory, and emotional regulation can be explored and utilised (Yassa, 2024). Calming smells can be used to manage stress and improve sleep. Clean smells are energising, like peppermint, eucalyptus, tea tree, fir needle, citrus, lemongrass, cinnamon, rosemary, etc., while softer smells are calming e.g., lavender, ylang-ylang, rose, and vanilla.

6.5 The Taste System

Taste receptors are situated in the taste buds, each containing 50 – 100 receptors. Taste receptors detect sweet, bitter, sour, salty or savoury/umami. Taste messages are relayed to the bottom brain and from there to the sensory cortex (Moore, 2023). Taste is one of our social senses.

Measuring taste thresholds will explain preferences relating to work lunches and snacks, adventurous vs. non-adventurous eating, reluctance to attend team builds, socials, or offsites, etc. Taste seekers often feel the need to snack when bored and under-stimulated. Taste avoiders often limit food options and follow a restricted diet.

Taste productivity tips are helpful to both taste seekers and taste sensitives. Sweet and salty tastes are calming. Bitter, sour, spicy, and savoury tastes are alerting. Ice is also a tried and tested productivity booster. Crunchy and chewy snacks and lunches provide regulating movement input through the jaw joint which is both calming when stressed and energising when under-stimulated. Chewing gum is a great sensory strategy.

6.6 The Movement Systems

The movement system consists of two sensory systems, the vestibular and proprioceptive systems broadly speaking, head movement and body movement.

The **Vestibular System** detects changes in head position, and is responsible for balance, spatial orientation, and a stable eye gaze. Vestibular receptors situated in the labyrinth of the vestibular organ in the inner ear, travel to the brainstem and then to the cerebral cortex, precisely which area is uncertain (Bundy et al., 2002). Vestibular is one of our two regulation senses, impacting levels of alertness and ability to focus.

The **Proprioceptive System** detects a physical sense of self, our body's position in space. Proprioception contributes to body movement and behaviour. Proprio-receptors are situated in the muscles, joints, and skin. Messages are relayed to the bottom brain and then to the sensory cortex (Bundy et al., 2002). Proprioception is the universal regulator; it soothes all other sensory systems and helps us feel calm alert.

Movement is of utmost importance in the work environment, as it directly impacts levels of arousal through connectivity with the Reticular Activating System. The need to move, fidget, and spend time away from your desk will be clarified. The struggle to focus while sitting passively behind a desk, will be explained. The need for movement opportunities at the office will be highlighted and investigated, and exercise options best suited to a specific movement threshold score will be suggested for optimal regulation, stress management, and productivity. Different movement threshold employees require different office adaptations for self-regulation and performance. Workplace adaptations could directly impact the bottom line.

Low threshold scores for movement always refer to vestibular sensitivity, which may result in motion sickness, fear of heights, overload while commuting to work, overload when taking winding staircases, vertigo, disorientation as result of sudden changes in head position, etc. As proprioception is the universal regulator for all sensory systems, movement against resistance and

movement against gravity can be used to ease these conditions, e.g., providing firm deep pressure from the top of the head through to the neck while focusing on a stable object or the horizon.

6.7 Sensory Workstyle

Sensory needs across all 7 sensory systems determine workstyle: our habits, rituals, behaviour at work, as well as preferred workspace, work tasks, and colleagues.

We are mostly unconscious of our sensory needs, although we constantly seek sensory balance; less stimuli if we are in overload, and more stimuli if we feel under-stimulated or bored. If we determine sensory workstyle, we can optimise person/workspace fit, create optimal hybrid and flexi work solutions, and identify which tasks could be completed where, with whom, and when. This will improve employee engagement, wellbeing, and performance.

On a sensory level we either over- or under process the work environment, which impacts the ability to be productive in different work scenarios. Guidance is provided regarding hybrid and flexible work solutions, and employers are assisted in identifying unique work environment needs. Employers and managers are encouraged to optimise workspaces through subtle, easy-to-implement, and often inexpensive adaptations with the aim of increasing productivity and wellbeing.

Knowledge around Sensory Workstyles may change the workplace from “mandate to magnet”, essential for especially millennials no longer wishing to work at organisations where wellbeing is not a priority. According to Headspace Health’s (2022) Workforce Attitudes report, “9 in 10 employees report doing their best work when they feel connected to their team and manager”.

Sensory Seeking Workstyle individuals need energising and collaboration spaces, breakaway areas, time in-office for social interaction, and activating sensory stimuli. They are a good fit to in-office work solutions.

Sensory Sensitive Workstyle individuals need calming re-regulation spaces to reduce sensory overload and stress; and will increase productivity. They are a good fit to hybrid and/or remote work solutions.

7. PRACTICAL APPLICATION OF THE SWAP

7.1 Benefits of SWAP Results

SWAP results clarify amongst others, work habits, rituals at work, specific behaviour patterns, distractibility, attention to detail, typical communication style, appetite for risk, a preference for certain colleagues, and the impact of the work environment on wellbeing and productivity.

SWAP results are accompanied by a short report focusing on improvement of all four pillars of wellness: physical, mental, social, and spiritual, as well as productivity.

For each sensory system, the SWAP report provides information on:

1) Sensory Threshold Scores,
2) What this Means,
3) Preferences,
4) A Word of Wisdom,
5) Wellbeing Strategies, and
6) Productivity Adaptations.

Employees are empowered to better understand and manage each one of their sensory system needs at work, and experience immediate regulation for a healthy, happy, and productive work life.

7.2 Benefits of Self-Regulation at Work

Self-regulation is crucial to remain calm, preserve relationships, think clearly, and solve problems effectively. Dysregulation results in atypical behaviour, e.g., road rage due to a fight/flight/fright bottom brain response.

The ability to regulate on a sensory brain level results in modulated emotions and clear top brain thinking. It benefits the individual, as well as the entire team.

The typical activation curve may include the following levels: I am okay, I am stressed, I am overwhelmed, I am in overload, I am in shut down. Preventative sensory strategies can be implemented when employees register that they are going into the 'Stressed' level of arousal. Regular sensory check-ins are helpful, and could include asking yourself the following questions:

Am I thirsty?

Am I hungry?

Do I need to take a movement break?

Is my skin feeling dry/irritated?

Do I need to rest?

Am I still productive?

Am I responding emotionally due to overload?

Are my eyes irritated/scratchy/red?

Is my posture upright with my shoulders back?

Is my heartrate faster than normal?

Am I feeling irritable?

Are my clothes comfortable and a good fit?

Do I sense an approaching headache or migraine?

Am I breathing normally and deeply, or subconsciously holding my breath?

Am I fixating my shoulders?

Is my stomach tied in a knot?

7.3 Self-Regulation through Sensory Strategies

Difficulty with self-regulation, the ability to self-adjust levels of alertness in order to stay functional at work refers to the need to adjust demands, activities, and the environment to work constructively. An increased understanding of one's Sensory Workstyle will improve the management of levels of alertness.

Alerting sensory strategies will increase levels of arousal when under-activated and bored, while calming sensory strategies will reduce levels of arousal when overloaded, stressed, and anxious (Cherry, 2023).

The general golden rules for sensory self-regulation broadly include the following:

1) Less visual and auditory stimulation – give eyes and ears a break.
2) Nourish the senses of touch, smell, and taste.
3) Utilise the movement system – change head position, body position, and/or your physical environment where possible.

Dysregulation starts on a sensory brain level, triggering the fight/flight/fright response, we then move to the limbic brain or mid-brain where uncomfortable emotions are felt and then become dysregulated on a cognitive level where clear and conscious thinking patterns are disrupted.

To self-regulate effectively and quickly, this bottom-up hierarchy should again be followed:

1) **Do** something on a sensory level.
2) Notice and experience gradual emotional regulation, and then,
3) Incorporate top-brain regulation strategies such as thankfulness, fact checking, humour, etc.

7.4 Productivity Adaptations

Calming spaces to reregulate and minimise overload are recommended, as well as energising spaces to activate and increase levels of arousal. Collaboration spaces are needed, especially for hybrid teams connecting only on occasion.

Considering all seven sensory systems in workspace design could include, amongst others, the use of colour, light, shapes, acoustics, haptic- and touch elements, proximity to calming and alerting snacks and beverages, movement options for both vestibular seekers and vestibular sensitives, etc. These elements are all crucial to multi-sensory informed design in a workspace where safety and comfort can be achieved in the right environment according to Maslow's hierarchy of human needs. Employees are subsequently able to move from a basic need of safety, to trust and belonging, and then onwards to self-confidence and ideally self-actualisation, impacting performance and output (McLeod, 2024).

Sensory Assessments of the work environment accompanied by easy to implement design recommendations are powerful tools for business owners and managers, especially considering virtual and digital workspace realities resulting in ever-increasing levels of dysregulation (Kerr, 2022).

8. TEAM AWARENESS AND COHESION

8.1 Benefits of Team Awareness

When labels are dropped and sensory workstyle differences are discussed and embraced in a safe environment, team awareness increases. The different sensory Workstyles have different strengths, which could be used for improved performance and cohesion within a team, playing to everyone's strengths.

High threshold employees have high energy levels and are good at starting and initiating projects, are often excellent at establishing relationships and networking, are visionaries, and not averse to risk.

Low threshold employees have a quiet strength, are good at task completion, are focused on detail, are early starters, self-motivated, and almost always able to meet deadlines. They are excellent at crossing t's and dotting i's, and are intuitive, sensitive, and considerate toward colleagues.

Employees want to feel included and show high levels of engagement when they form part of a cohesive team. Engaged employees are productive employees, increasing turnover (Barsoux et al., 2022).

9. LEVELS OF AROUSAL = PRODUCTIVITY

According to Bundy et al. (2002), “Modulation of sensory input is critical to our ability to engage in daily occupations. Filtering of sensations and attending to those that are relevant, maintaining an optimal level of arousal and maintaining attention to tasks, all require sensory modulation”. Modulation ***is*** the ability to concentrate, making the SWAP a science-based productivity tool and a clear business strategy.

9.1 Optimal Alertness/Arousal

Individuals with high sensory thresholds, tend to be under-responsive, while individuals with low thresholds tend to be over-responsive, presenting with distraction and over-reaction (Bundy et al., 2002).

The aim is to maintain calm-alert levels of optimal arousal for functionality, focus, and productivity. Levels of arousal refers to consciousness and wakefulness, present and ready to perform on-task. Benarroch et al. (1999, as cited in Bundy et al., 2002) defined consciousness as “an awareness of environment and self”.

High sensory threshold scores on the SWAP are often the sensory systems in which more stimulation is required for focus and energy to be productive at work.

Low sensory threshold scores on the SWAP are often the sensory systems in which less stimulation is required for focus, comfort, and calm-alert productivity at work.

Employees can be taught to add or reduce, according to their unique sensory threshold results and needs.

9.2 Person/Task/Environment

With knowledge of Sensory Workstyles, optimal person/task/environment fit can be selected. This will improve employee wellbeing, job satisfaction, engagement, and performance.

On a practical level, sensory seeking employees could complete mundane routine tasks first thing in the morning through collaboration in a vibey sensory rich environment or in-office. Through the interplay between person, task, and environment, optimal engagement and performance could be achieved amongst sensory diverse teams.

Sensory avoiding and sensitive employees could complete the majority of work tasks (especially high-focus tasks) in a calm, quiet, and contained environment and choose, where possible, a workspace where they feel optimally productive and comfortable. Truly flexible work is no small achievement and cannot be embarked upon one-sidedly. Employers and employees alike need knowledge and guidance for successful implementation (Praslova, 2023).

10. SENSORY SCIENCE OF SELF-REGULATION

Dysregulation due to environmental overload starts on a sensory brain level. Sensory regulation is powerful as it follows the same hierarchical path for quick and effective bottom-up regulation.

The most important and relevant brain structures for regulation are situated in the bottom brain regions: the ***amygdala, hypothalamus,*** and the ***reticular activating system***.

10.1 The Amygdala

The amygdala of the brain sounds the alarm when danger is perceived in the environment and a fight/flight/fright reaction is triggered on a sensory and emotional brain level (Moore, 2023). Emotions and sensory stimuli are intricately connected, as amygdala cells fire in immediate response to sensory stimulation. Providing the amygdala with nonthreatening sensory input, is a powerful, effective, and quick self-regulation strategy.

10.2 The Hypothalamus

The hypothalamus in the midbrain controls the autonomic nervous system (ANS). The autonomic nervous system consists of the sympathetic nervous system which triggers the fight/flight/fright stress response, and the parasympathetic nervous system which triggers the rest, digest, relax response (Moore, 2023). The hypothalamus responds powerfully to either triggering or regulating sensory stimuli - helpful knowledge to use when self-regulating.

10.3 The Reticular Activating System (RAS)

The reticular activating system is responsible for wake and sleep patterns and levels of arousal. The RAS is the brain's sensory relay system where many sensory pathways meet before further relay to higher brain structures. The reticular activating system responds quickly and powerfully to either activating or inhibiting sensory stimuli, in order to self-adjust levels of arousal through sensory strategies (Bundy et al., 2002).

10.4 Practical Regulation Exercises

Sensory Mindfulness

The 5, 4, 3, 2, 1 Sensory Mindfulness Technique provides the amygdala with immediate nonthreatening sensory stimuli to calm the fight/flight/fright response.

Focus on 5 visual stimuli in the environment, 4 auditory stimuli (two of those a deep breath in and prolonged exhale), 3 touch properties, 2 smells, and 1 taste sensation. This will ground you in the present, and alleviate stress and anxiety, while improving concentration.

Active Walking

The movement systems (vestibular and proprioception) are both engaged when taking a walk – mild changes in head position are accompanied by body movements against resistance or gravity, while walking incorporates active block breathing. Breathe in for four steps, hold your breath for four steps, exhale for four steps, and wait for four steps. This technique is especially helpful to sensory seekers or individuals struggling with passive breathing exercises and meditation.

Touch, Smell, Taste, and Movement

The visual and auditory systems (information senses) are generally overloaded due to digital and virtual workspace realities. Schedule and prioritise offline activities involving touch, smell, taste, and movement e.g., playing table tennis during a work break, or making a snack to be enjoyed outside.

In-Chair Regulation

It is not always possible to get up for movement regulation. In-chair stretches, and mini-movements are helpful to self-regulate where and when needed. Chair push-ups provide regulating proprioception through the shoulders, arms, and wrists.

Intermittent exercise during prolonged sitting had a positive effect on executive function, cerebrovascular, and psychological responses according to a study conducted by Horiuchi et al. (2023). They recommended one minute's movement for every twenty minutes of sitting e.g., performing half-squats or other mini movements like calf raises, ankle rotations, etc. Concentration was found to have improved by 8-11%.

In-chair Stretches

Straighten legs and flex quadriceps. Rotate ankles. Place feet back on the floor and perform hip tilts forward and back – as hips tilt forward, a hollow back stretch is achieved, as hips tilt backwards, a rounded back stretch is achieved. Neck stretches: place opposite hand above ear, and gently pull without forcing. Adjust hand position to behind your head, and gently perform a diagonal neck stretch. Change sides. Link fingers and place both hands on top of the head. Provide firm deep pressure down into the neck. Position palms against each other and push hands together firmly. Link fingers and pull. These in-chair stretches provide calming joint compression and contraction. Look up to the ceiling and place chin on your chest (x4), gaze over left and right shoulders (x4). This will improve levels of alertness and performance through regulating proprioception and vestibular stimulation.

Sensory Rhythms

Determining your optimal sensory rhythms for wellbeing and productivity are helpful. Regular sensory check-ins will clarify the need for breaks. High threshold employees may need to set an alarm or reminders to take breaks, while Low threshold employees may need to force themselves to focus for at least 40-minutes before taking a break. Finding your own unique sensory rhythm will improve output but will look different for all of us. If longer periods of concentration are required, use mini movements, chew gum, drink lots of iced water, use an alerting smell (in your own space), sit on a ball, or use a standing desk.

11. WHOLE-BRAIN REGULATION

Whole brain regulation combines bottom-up sensory strategies with top-down cognitive behavioural strategies, a powerful way to regulate and achieve optimal performance at work.

An example of visual whole-brain regulation could include walks in nature (utilising the movement system while resting visual from digital input) while practicing thankfulness, gratitude, and cognitive strategies like rhythmical breathing and/or naming of plants and trees.

An example of auditory whole-brain regulation could include listening to regulating music, while enjoying uplifting and meaningful lyrics for cognitive regulation.

An example of touch whole-brain regulation could include following complex recipes and/or cooking demonstrations for touch stimulation, while concentrating on the task at hand.

An example of smell whole-brain regulation could include wine tastings, or gardening while learning about plants and committing plant names to memory.

An example of taste whole-brain regulation could include food and wine pairings, preparing food as a family or circle of friends, and/or cultivating mindful awareness while eating.

An example of movement whole-brain regulation could include practicing yoga paired with meditation, visualisation, and mindful breathing.

12. ADMINISTRATION OF THE SWAP

12.1 User Instructions

When completing the SWAP unconscious, uncontrolled, knee-jerk sensory reactions are assessed on a bottom brain level, and not cognitive thinking. Delegates should be instructed to answer quickly, intuitively, and according to their sensory comfort levels.

There are no right or wrong answers, as we are all different from a genetic sensory perspective. Encourage delegates to answer quickly, not taking longer than 10 minutes when completing the SWAP questionnaire.

12.2 SWAP Format

The SWAP is available in digital format, doing away with bulky and unnecessarily long PDF documents; a short and concise PDF report is however available to print out, should this be preferred. The SWAP is user-friendly and embracive of a younger as well as older workforce, with a smaller carbon dioxide footprint. The use of tech-based mental health apps continues to see dramatic growth according to Headspace Health (2022): “Blue collar workers and executives report the highest use of tech-based mental health services, and employees want care to be easily accessible, financially feasible, and deeply personalized”. The SWAP will be available as a smartphone application.

The SWAP originally consisted of 15 questions per sensory system, and 20 questions for Sensory Workstyle; 110 questions in total. The 91-item questionnaire has the following number of items per scale: Auditory (13), Movement (14), Smell (12), Taste (12), Touch (11), Visual (14), and Workstyle (15). The questionnaire is easy and quick to complete. A 5-point Likert-type scale is used, with both positive and negative scoring. The options include Never, Seldom, Occasionally, Frequently, Always.

A positive score measures low sensory thresholds, while negative scoring measures high sensory thresholds.

Normative data is available for the SWAP. Delegates with a raw score within the lower band of 1, 2, or 3, have Low Sensory Thresholds. Delegates who score between 4, 5, or 6 fall in the Neutral Threshold category, and delegates with a raw score of 7, 8, or 9 have High Sensory Thresholds.

12.3 SWAP Scores

Sensory threshold scores do not change over time; an improvement or change of results are not plausible or possible. The focus of the SWAP is self-awareness and self-management. Awareness brings immediate relief, a deeper understanding, and increased empathy with the self and others. It

is liberating to identify habits, rituals, preferences, and reactions as result of sensory thresholds and not social, emotional, or behavioural traits.

The results obtained from the SWAP provide employees and employers with scientific and validated threshold scores for all 6 sensory systems (Visual, Auditory, Touch, Smell, Taste, Movement) as well as Sensory Workstyle. Results refer to either sensory under-responsiveness (high thresholds), sensory over-responsiveness (low thresholds), or sensory neutral responses. A short individual report with a summarising overview page for each sensory system is provided.

13. INTERPRETATION OF RESULTS

The SWAP results should be interpreted keeping Winnie Dunn's four sensory profiles in mind. Active and passive responses to sensory thresholds result in different behaviour patterns. High, Neutral, and Low Threshold scores are provided.

13.1 High Thresholds – Active Response (Sensory Seeking)

High threshold delegates with an active response are easy to identify; they are sensory seeking, active, on-the-go, busy, and do not wish to miss out on anything. They sometimes over schedule and are vulnerable to burnout due to lack of self-care and adequate rest. They should be encouraged to find balance and take a break from work and prioritise nourishing sensory-rich leisure time. Sensory seekers could potentially overload sensory sensitive colleagues. Sensory seekers are often fidgety, energetic, and fast-paced. They prefer short, concise, and to the point communication. They often do not pay adequate attention to detail. Reckless behaviour patterns, e.g., participation in extreme adventure sport or a vulnerability to addictive behaviour patterns may occur. Cognitive awareness is crucial. Sensory seekers need energising spaces, movement opportunities, collaboration spaces, new strategies, social interaction, and sensory system activation through flexible seating options for optimal wellbeing and performance. Exercising at the start and/or during their workday is recommended, as well as walking meetings, standing meetings, and opportunities to travel outside of the office. Sensory seekers are generally spontaneous, enjoy surprises and novelty, and prefer variety in their workday. They find sensory stimulation pleasurable and energising.

13.2 High Thresholds – Passive Response (Low Registration)

High threshold delegates with a passive response present with low registration of sensations and therefore appear very calm, regulated, and able to concentrate under varied and even sensory overloading work conditions.

Low Registration individuals are even-tempered and not easily irritated. They may however present with low energy levels and may struggle to get going and feel motivated. They may forget to exercise, take movement breaks, eat, drink water, get adequate sleep, etc. Energy levels visibly increase with exposure to energising sensory stimulation and stimulating environments. Affect or emotions may appear flat or disinterested, except when they are fully activated through sensory input. Low Registration employees require cognitive awareness around under-stimulating work environments; they need to grasp the concept that more intense sensory input is required for them to feel focused and energised. They need to self-activate through sensory strategies, regularly change head and body position, and regularly change work environments e.g., alternate between an office chair, ball chair, standing desk, shared workspace, and/or vertical work surfaces, collaboration spaces, etc. They are often easy-going, reliable, and conscientious colleagues.

Low Registration employees need energising spaces, movement opportunities, collaboration opportunities, new strategies, etc. for wellbeing and performance. Exercising at the start and/or in the middle of their workday is recommended, as well as walking meetings, standing meetings, and opportunities to travel outside of the office.

13.3 Medium Thresholds – Neutral Response

Sensory Neutral employees with medium threshold scores experience minimal impact on the brain because of sensory stimulation from their work environment. At times they may be seeking more intense sensory stimuli, and at other times feel more sensitive. They are even-tempered, adaptable, flexible, calm, and steady. Sensory neutral employees make fair leaders and good mediators. They may struggle to implement decisions as they take time to obtain everyone's opinion and consider different points of view. Medium Threshold employees are equally productive in a sensory rich and sensory calm environment, and a perfect fit to hybrid or flexible work solutions.

13.4 Low Thresholds – Active Response (Sensory Avoiding)

Sensory Avoiders are easy to identify as they often avoid social interaction, group sport, group work, collaboration, sharing of their space, etc. They actively aim to control their environment and decrease exposure to sensory stimuli. They are often frustrating in that they may decline social invitations or new initiatives. They are vocal around continued work from home, as well as extreme flexibility at work. They are neat, organised, pedantic with detail, and will complain about untidy workspaces. Sensory avoiders' default mode is to say 'no'. They require convincing, time, pre-warnings, preparation, and careful consideration before implementing changes and new strategies. They are excellent at starting and completing projects but may be seen as negative. They are vulnerable to stress, anxiety, depression, and may be perceived as perfectionistic and/or controlling. They need alone time, calming spaces, self-regulation time, and self-regulation spaces for optimal wellbeing and performance. Back-to-back meetings, road shows, travelling to clients, etc., will all be experienced as overloading and stressful. Self-regulation should be prioritised and implemented throughout the day. Sensory avoiders prefer and are good at establishing structure and routine. They are intuitive and sensitive towards colleagues.

13.5 Low Thresholds – Passive Response (Sensory Sensitive)

Sensory Sensitive employees do not actively avoid sensory stimulation, but are overwhelmed, stressed, and overly aware of sensory input. This may result in irritability and fatigue. Burnout is a real danger. Sensory Sensitives may be extroverts resulting in sensory overload due to social needs. They are more likely to engage in and enjoy sensory-rich activities and environments when they feel safe and have been pre-warned and prepared. They are good at starting and completing projects, and attentive to detail. They are vulnerable to stress, anxiety, and depression. They need alone time, calming spaces, as well as self-regulation time and self-regulation spaces for optimal wellbeing and performance. Self-regulation should be prioritised and implemented throughout the day. They are organised, attentive to detail, and hard workers. They are intuitive regarding emotional needs and moods within a team and are caring colleagues.

14. CONCLUSION

The SWAP identifies individualised and differing employee experiences within the same work environment and clarifies how conducive these environments are to employee 1) wellbeing and 2) productivity.

Sensory Workstyles are the "why" behind preferred work environments, tasks, and colleagues. SWAP results assist in shaping the future of work through the implementation of sensory-smart workspace design, utilisation of practical sensory strategies for self-regulation, and development of collaborative flexible and hybrid work solutions.

Increased empathy and trust amongst sensory diverse teams are other benefits of the SWAP. Science-based support, empowerment, and optimisation of teams is at the heart of this workplace tool. According to Headspace Health's (2022) Workforce Attitudes report, employees need "employers that make an effort to know them". The Covid-19 pandemic made work more human, with a "shared vulnerability which lead to authenticity" (Microsoft, 2021). Leading with empathy is one of the many benefits of the SWAP.

SWAP results are an essential source of information relating to uncontrolled reactions at work and could be used as a source of self-insight to self-manage, as well as team insight for effective team management.

Interpersonal perceptions and the diversity of sensory responses can be managed constructively, and relationships preserved and strengthened. Insight to support and optimise the different Sensory Workstyles is timeous and invaluable**.** According to Microsoft's (2021) annual Work Trend Index report, "… supporting each other is the most important work we could be doing right now".

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