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一次性正念冥想對於調節口譯學生逐步口譯焦慮之影響

Brief Mindfulness Meditation as an Intervention to Regulate Interpreter Trainees' Anxiety during Consecutive Interpretation

李佳純

Chia Chun Lee

指導教授：范家銘 博士

Advisor：Damien Chiaming Fan, Ph.D.

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本論文係李佳純君(R09147010)在國立臺灣大學翻譯碩士學位學程完成之碩士學位論文，於民國 112 年 7 月 31 日承下列考試委員審查通過及口試及格，特此證明

口試委員：

范家瑀

(指導教授)

張鳳蘭

吳茵茵

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誌謝

世界上許多城市因疫情而先後封城的那年，沒料到我卻給自己開啟了一個新世界，除了無心插柳柳成蔭之外不知道還能怎麼形容。

在 GPTI 得到專任老師們有教無類的指導，每一位老師的專業和學術成就都令人敬仰，每一堂課都是珍貴的養分。這三年多期間，從 R09 每一位同胞身上得到許多啟示與回饋，如此萬幸能與你們同屆。在學期間待辦的行政事務繁多，多虧無所不知、有問必答的 Vicky 才能順利及時辦好。

這份研究能出爐，首先要謝謝茵茵老師的鼓勵並應允擔任口試委員。另一位口委張鳳蘭教授，是我未入學前生平上過第一堂口譯課的老師，後來有幸在校內再次相處了快一學期，感謝張老師在忙碌的教學生涯之餘抽空擔任我的口試委員。從定題目、實驗設計到結果分析和結論，徬徨無助甚至喪志的時刻，永遠都有指導教授范家銘老師耐心地給予任何我所需要的指引和資源。老師是我的燈塔，我的典範。

為了研究所需而在台灣正念工坊上了八週的 MBSR 課程，受惠於陳德中老師的指導，也感謝老師慷慨同意我使用他的正念引導音檔作為實驗素材。後來應工坊邀請，在線上為 Jon Kabat-Zinn 博士做逐步口譯，我從正念祖師爺的論文和著作的讀者，忽然變成他的口譯員，這大概就是口譯工作神奇的地方吧，你永遠不知道會被帶往何處。

最後要感謝我的家人一直以來無條件的支持，愛貓呂湘日夜的陪伴，還有吠，沒有你鼓勵我發揮潛能，就不會有現在的我。最重要的是感謝十位願意擔任受試者的好人，因為有你們，我終於能走到寫下 acknowledgement 的這一天。

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摘要

研究證實焦慮對短期記憶和注意力都有影響，兩者在口譯過程中至關重要。在運動和音樂等專業領域，焦慮早已有明確定義也一直是研究重點。運動員或音樂演奏家可能會因為過度擔心，而無法把注意力資源分配到表現上。由於正念練習有助於把注意力帶回到當下，部分運動和音樂研究探討了正念在減少壓力和提高表現方面的功效。

自 2013 年以來，口譯研究人員也開始探討正念訓練對口譯員的助益，這些研究採用的練習期間從四周到四年不等，然而長時間的固定投入對受試者或研究人員而言都是一項挑戰。

有鑑於此，本研究邀請八位口譯學生參與混合方法前後測準實驗研究，以探索一次性正念冥想的功效。量化數據包括情境-特質焦慮量表（STAI）分數、NASA 工作負荷指數（NASA-TLX）分數及逐步口譯（CI）表現分數，質性數據包括半結構式回顧性訪談及研究者觀察。結果顯示，大多數受試者進行 12 分鐘的正念呼吸練習之後，狀態焦慮和工作負荷指數皆有不同程度的下降，受試者對正念引導的接受程度會影響下降程度。實驗數據也顯示，相比狀態焦慮，工作負荷和口譯成績的負相關性更強，而狀態焦慮高的組別，通常情境焦慮也較高。本研究結果證實了一次性正念冥想有助於降低情境焦慮及工作負荷，口譯學生若有一套調節壓力和焦慮的對策，對於口譯學習會有莫大幫助。未來研究建議包括加入安慰劑對照組以確定正念練習的實際效果，或納入不同時間長度的實驗組來評估正念練習時間長度對口譯表現的影響。

關鍵詞：焦慮、正念、工作負荷、逐步口譯、口譯表現

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Abstract

Anxiety is known to have an impact on short term memory and concentration, both of which are crucial during the interpreting process. In professional fields such as sports and music where performance is evaluated according to a set of criteria, anxiety has long been researched and defined. Some of these studies explore the efficacy of mindfulness intervention in decreasing perceived stress and improving performance.

Since 2013, researchers have also been taking an interest in mindfulness training for interpreters. All of these studies applied mindfulness training for a set period of time that included multiple exercises. But the significant barriers to consistent attendance and practice were the schedule, continuity, and duration.

In light of this, eight interpreter interpreting students were invited to participate in a mixed-methods, quasi-experimental design to explore the efficacy of a brief mindfulness induction. The quantitative data included the state anxiety score from the State-Trait Anxiety Inventory (STAI), workload score from the NASA Task Load Index (NASA-TLX) and consecutive interpretation (CI) performance score. Results showed that a 12-minute mindfulness breathing exercise helped most of the participants lower their state anxiety level and perceived workload in various degrees. A calculation of Spearman's correlation coefficient (ρ) also indicated that workload was negatively correlated with CI performance more so than state anxiety. Future research suggestions include incorporating a placebo-controlled group to ascertain the genuine effects of meditation and different intervention groups with varying timeframes to assess their impact on the interpreting performance outcome.

Keywords: anxiety, mindfulness, workload, consecutive interpreting, interpreting performance

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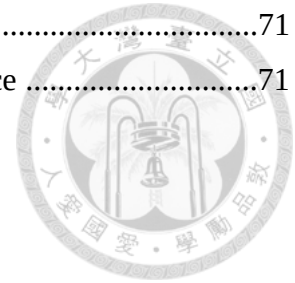

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Chapter 1 Introduction

Anxiety has been known to affect short term memory and concentration (Eysenck & Calvo, 1992, p. 429), both of which are crucial during the interpreting process. Liebert and Morris (1967) examined worry (a cognitive component) and emotionality (an affective component), two components of test anxiety (concerns about taking tests and being evaluated) and found that only worry was inversely related to performance expectancy. This finding was confirmed in later research such as Deffenbacher and Hazaleus (1985) and Zeidner (1998). Humphreys and Revelle (1984) and Sarason (1988) also argued that anxiety causes worry, and worry always impairs performance on tasks with high attentional or short-term memory demands. Namely, worrisome thoughts interfere with attention to task-relevant information, thus reducing the cognitive resources available for task-processing activities (Eysenck & Calvo, 1992). Anxiety's adverse effects on the performance of cognitive tasks was verified in a study about cognitive test performance and working memory capacity in Owens et al. (2014).

In professional fields such as sports and music where performance is evaluated according to a set of criteria, anxiety has long been researched and defined, and studies on the measures to mitigate sports-related anxiety or music performance anxiety (MPA) are abundant. Some of these studies explore the efficacy of mindfulness intervention in decreasing perceived stress and improving performance (see, e.g. Brown, 2016; Diaz, 2018; John et al., 2011; Lin et al., 2008； Perry, 2016; Shorey, 2020). Most of these studies have shown promising results, with one study finding that even a brief mindfulness intervention was able to improve objective performance, increase flow state propensity and decrease perceived stress.

Mindfulness is defined as an open-hearted, "moment-to-moment non-judgmental awareness" (Kabat-Zinn, 2005, p. 24). Through cultivating a non-judgmental awareness of

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the present moment, mindfulness practice can be a way to purge unwanted thoughts such as apprehension of the upcoming event or self-deprecating reflections on past performances. In doing to, more attention capacity could be allocated to the task at hand.

When executing their tasks, interpreters or interpreting trainees alike regularly encounter problem triggers such as high information density, speech rate, unfamiliar accents, enumerations and compound names, all of them increase processing capacity requirements (Pochhacker, 2015, p. 136). Furthermore, in consecutive interpreting (CI), interpreters often have to speak in front of an audience and temporarily become the focal point of a conference, and this would likely trigger public speaking anxiety that could further exhaust the mental capacity. Anxiety has garnered attention in interpreting research (Pochhacker, 2015), however, studies regarding the regulation of anxiety during interpretation are few and far between. Since 2013, a small but growing number of researchers have also been taking an interest in mindfulness training for interpreters. And yet, only a handful of empirical studies so far have been published about the effects of mindfulness training as applied to interpreting (Ivars & Calatayud, 2013; Hsiao, 2020; Johnson, 2016), and all of these studies applied mindfulness training for a set period of time, from four weeks to up to four years. While Ivars & Calatayud (2013) found that focused attention group (treatment group) significantly outperformed the control groups, the quantitative data of Johnson (2016) showed little to no relationship between mindfulness and attention, stress and attention, or any of these variables and interpreting performance.

As opposed to the fields of sports or music, the efficacy of a brief mindfulness intervention to enhance interpretation performance or mitigate interpretation anxiety has yet to be explored. Even if quantitative data did not always demonstrate a significant positive correlation between mindfulness training and interpreting performance, qualitative data showed that participants of treatment groups individually reported that the meditation helped

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their performance. A short mindfulness meditation before an interpreting assignment, especially for consecutive interpretation, where the interpreter is de facto a performer, can be a form of a ritual before every performance to ground the interpreter.

Anxiety not only affects interpreting students' test results, failure of finding an effective way to regulate anxiety before an interpreting task could cause the interpreting trainees to struggle as they are training to be professionals. As Stanson (2019) wrote:

> The ubiquity of MPA [music performance anxiety] may have resulted from the nature of job insecurity in the music performance field; it was not encouraged to address these issues with one's private instructor or colleagues for fear of negative consequences, such as the loss of career opportunities, so the issue was never resolved. (introduction viii)

When it comes to the field of interpreting, the situation is similar. Interpreter trainees are evaluated by teachers who are also working professionals in the interpreting field. The anxiety of performing badly in front of the instructor is likely connected to the fear of the loss of career opportunities in the future. This shows that anxiety not only is a debilitating factor to interpreter trainees' academic performance, it can even play a role in deciding the interpreter trainees' professional future. Finding a way to self-regulate anxiety thus is one of the important steps for interpreter trainees when they progress from novice to expert.

Recognizing the importance of regulating anxiety during interpretation, the aim of the present research tried to answer the following questions:

1. To what extent does a mindfulness intervention help reduce self-reported state anxiety?
2. To what extent does a mindfulness intervention help bring down perceived workload?
3. To what extent does a mindfulness intervention help enhance CI performance?

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Chapter 2 Review of Literature

This chapter provides a comprehensive literature review, initially exploring the anxiety-performance connection through Processing Efficiency Theory (PET). It also covers performance anxiety in sports and music, examines mindfulness meditation for anxiety reduction in these domains, and investigates performance anxiety in consecutive interpretation studies. Finally, the chapter delves into empirical studies on mindfulness training's effectiveness in interpreting and assesses the efficacy of brief mindfulness inductions, setting the stage for subsequent research sections.

2.1 Anxiety and Performance and the Processing Efficiency Theory (PET)

Anxiety often impairs performance of "difficult" tasks (Eysenck & Calvo, 1992). The processing efficiency theory (which represents an extension of earlier theoretical statements by Eysenck, 1979, 1982) is basically designed to provide an explanation of the effects of state anxiety (a transitory emotional response involving unpleasant feelings of tension and apprehensive thoughts) or test anxiety (concerns about taking tests and being evaluated) on performance as opposed to trait anxiety (the predisposition of perceiving situations as threatening.) Researchers (Humphreys & Revelle, 1984) studied the relationship among individual differences in personality, motivation, cognitive performance and the role of anxiety. According to them, state anxiety has a cognitive component—worry—which can be "equated with avoidance motivation, which produces a subsequent decrease in resources allocated to the task (on-task effort)" (Humphreys & Revelle, 1984, p. 176).

Worry (e.g., self-preoccupation, concern over evaluation, concern over level of performance) is an important construct within the processing efficiency theory. Worry about task performance can lead to an individual pre-empting some of the processing and storage resources of the working memory system. The essential feature of a working memory system

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is that it is concerned with both active processing and the transient storage of information. As a consequence, any adverse effects of state anxiety on performance tend to be greater on tasks which impose substantial demands on the capacity of the working memory system (Eysenck & Calvo, 1992).

It is important to make the distinction between performance effectiveness (quality of performance) and processing efficiency (effectiveness of performance and the effort invested.) High-anxious individuals tend to devote more of their processing resources than low-anxious individuals to worry and to other task-irrelevant processing which lead to impaired performance (Eysenck & Calvo, 1992). As such, Eysenck & Calvo proposed several predictions. Among them, adverse effects of anxiety on task performance generally become stronger as task demands on working memory capacity increase; and, anxiety reduces transient storage capacity; also, anxiety has powerful adverse effects on tasks with high storage and processing demands. According to the empirical evidence, Eysenck & Calvo have concluded that:

> (a) state anxiety is generally associated with poor processing efficiency under test conditions, as high-anxiety individuals use more processing resources than low-anxiety individuals; (b) the effects of state anxiety on performance effectiveness depend on (1) the availability and utilization of additional resources and (2) the demands of the task on working memory (Eysenck & Calvo, 1992, p. 429).

The processing efficiency theory is widely quoted and tested in the study of anxiety and performance, such as Williams et al. (2002); Murray and Janelle (2003); Wilson et al. (2007); and Owens et al. (2008). Based on cognitive psychology, Eysenck, Derakshan, Santos, & Calvo in 2007 proposed the attentional control theory (ACT) to account for the effects of anxiety on cognitive performance, both PET and ACT assume that anxiety impairs

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the efficiency of the central executive component of the working memory system (Eysenck et al., 2007).

2.2 Performance anxiety across the fields: athletic and music performance

Anxiety is a common emotional state experienced by athletes at all levels of performance (Ford et al., 2017). Research has shown that high trait anxious athletes generally display greater increases in state anxiety prior to competition than do low trait anxious athletes (Raglin, 1992). Excessive worrisome thoughts can direct athletes' attention away from the task and onto themselves. This increase in self-focused attention resulting from an increase of stress (Carver & Scheier, 1981) can undermine performance on a complex task, an argument that has been supported by studies demonstrating that with the presence of others or a mirror, motor performance suffered (Martens & Landers, 1972). Task-focused attention happens when the performer experiences a nonjudging, metacognitive mindful absorption in the task (Gardner & Moore, 2007).

Music performing usually encompasses intense psychological experiences, from which music performance anxiety (MPA) is amongst the most damaging and pervasive (Rodríguez-Carvajal et al., 2017). MPA is a well-documented condition that has been examined among populations ranging from adolescents to professional musicians (Diaz, 2018). Getting ready for a public music performance is often a stressful experience: college musicians typically dread their performance final and professional musicians will be nervous for an upcoming audition (Shorey, 2020). MPA manifests as a multi-sided clinical problem including cognitive and physiological symptoms (Juncos & de Paiva e Pona, 2018), of which excessive self-focused attention on the perceived threats can lead to a negative self-judgement and ultimately generate anxiety symptoms. This phenomenon could impair music performance (Rodríguez-Carvajal et al., 2017). Beginning in 2003 with Chang et al. (2003), a

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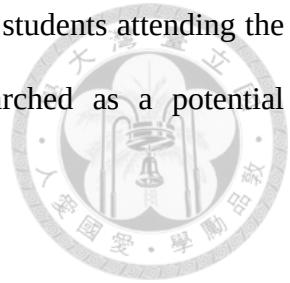
seminal research on the impacts of a meditation intervention on music students attending the Manhattan School of Music, mindfulness practice has been researched as a potential treatment for musicians struggling with MPA (Stanson, 2019).



2.3 Mindfulness meditation for stress and anxiety reduction

Mindfulness is defined as a "moment-to-moment, non-judgmental awareness" and is characterized by "paying attention in a specific way, that is, in the present moment, and as non-reactively, as non-judgmentally, and as openheartedly as possible" (Kabat-Zinn, 2005, p. 24) Or, as defined by other researchers, mindfulness consists of open and sustained awareness and non-interference of judgement with sensory experience (Brown & Ryan, 2003; Brown et al. 2007). In the late 70s, Jon Kabat-Zinn developed an eight-week program called Mindfulness Based Stress Reduction (MBSR) aiming to help relieve suffering of terminal patients from pain and stress (Grossman, P., Niemann, L., Schmidt, S., & Walach, H., 2004). It has since become widely implemented in workplaces, the military, sports and education. The construct of mindfulness varies, depending on whether it is being used to refer to mindfulness as a trait, state or practice (Johnson, 2021). Trait (or dispositional) mindfulness is a mental trait or stable characteristic of personality, while state mindfulness refers to an individual's subjective experience of "receptive attention to and awareness of present moment events and experience" (Brown et al., 2007, p. 212). When relating to performance, this skill is valuable because mindfulness enables an individual to shift attention from oneself to the task (i.e., self-focus vs. task-focus), due to the increase in one's own awareness of these processes (Perry, 2016).

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2.4 Mindfulness as an Intervention for Athletic and Music Performance

2.4.1 Mindfulness for Athletic Performance

Contemporary sport psychological interventions have incorporated mindfulness as a central technique for improving athletic performance, and applied sport psychological researchers have recently developed evidence-driven models based on mindfulness to improve and maintain successful athletic performance (Moore & Gardner, 2001; Gardner & Moore, 2004; Gardner & Moore, 2007; Moore, 2009; Kaufman et al., 2009). In the study by Scott-Hamilton et al. (2016), cyclists in the test group were assigned to an eight-week mindfulness intervention. The results showed significant positive effects on mindfulness, flow (a special psychological state of total absorption in a task), and pessimism for the 27 cyclists in the mindfulness intervention condition compared with the 20 cyclists in the control condition. This, suggests that mindfulness-based interventions tailored to specific athletic pursuits can be effective in facilitating flow experience (Scott-Hamilton et al., 2016).

Another research conducted by Perry (2016) recruited 65 undergraduate college students and randomly assigned to either the intervention group (n=32) or the control group (n=33) (Perry, 2016). The control group were asked to read magazines for thirty minutes, and the intervention group participants participated in a thirty-minute mindfulness intervention. Following either the control task or intervention, all participants completed a second putting trial. Results from this study supported the demonstration of immediate performance gains attributable to a brief mindfulness intervention (Perry, 2016).

Another research looked into the effect of mindfulness meditation on HPA-Axis in pre-competition stress in sports performance of elite shooters has found positive results of a mindfulness intervention. (John et al., 2011). 96 shooters were examined as in experimental and control (48 in each group). The experimental group received four weeks of mindfulness meditation therapy (MMT), twenty minutes per session, six days a week. There's a one-week

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study to determine the follow up effect, so the total of the study was five weeks. The result of the study shows that in MMT group, the cortisol (a hormonal response to acute stress) level in saliva decreased in post-intervention of 50% (.66) and in follow-up of 20% (.93). Whereas control group showed an increase of 47% (1.95) and 26% (1.60) pre-competition and post competition respectively. In performance score, experimental group showed an increase of 2.6% (542) from base line (528), whereas control group showed decrease of 0.9% (518) from base line (524) (John et al., 2011).

As exemplified in Table 2.1, research converges to suggest that a mindfulness intervention of thirty minutes, four weeks or eight weeks can all lead to significant results in reducing anxiety or improve performance.

Table 2.1

Previous Studies on Mindfulness as an Intervention to Improve Athletic Performance

Study	N	Treatment	Repetition	Duration
John et al (2011)	96	4-wk MMT	Y	20-min/6 d/wk
Scott-Hamilton et al. (2016)	47	8-wk HM	Y	30-min/daily
Perry (2016)	65	30-min MI	N	30-min

Note. MMT= Mindfulness Meditation Therapy HM= Home Meditation
MI= Mindfulness Induction

2.4.2 Mindfulness as an Intervention for Music Performance Anxiety

The first study to explore mindfulness meditation as a tool for understanding and regulating MPA was a dissertation by de Felice in 2004, since then there have been many studies continuing with this approach, such as Lin et al. (2008); Butzer et al. (2016); Rodríguez-Carvajal et al. (2017); Juncos and de Paiva e Pona (2018); Diaz (2018); Stanson (2019); and Shorey (2020).

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De Felice considers the connection of stage fright and music performance anxiety, and quoted Gabbard's (1979, p.383) definition of stage fright: "a universal experience of performing artists, public speakers and all others who stand before an audience as the focus of its attention." Positive and negative thoughts may come to mind while performing. As mindfulness meditation teaches, these thoughts should be acknowledged, not pushed away (De Felice, 2004). There is an abundance of studies on the efficacy of mindfulness meditation for the treatment of MPA, such as Stanson's (2019), in which the results indicated that mindfulness training can significantly decrease self-reported anxiety. In Lin et al. (2008), the results showed that a decrease in music performance anxiety was associated with meditation. Results from Diaz (2018) also provided insights into how meditation may help predict performance anxiety. See Table 2.2 for previous experimental studies on MPA that adopted different treatment periods.

Table 2.2

Previous Studies on Mindfulness as an Intervention for MPA

Study	N	Treatment	Repetition	Duration
Lin et al. (2008)	19	8-wk MT	Y	1hr and 15min/wk
Butzer et al. (2016)	103*	8-wk YM	Y	Y: 1.25hr/d M: 30 min/5d/wk
Stanson (2019)	26	2-wk MDT	Y	1hr/10 sessions
Shorey (2020)	17	10-min MM	N	10-min

Note. MT=Meditation Training YM=Yoga and Meditation MDT=Mindfulness Training; MM=Mindfulness Meditation.
*Participants were recruited across three years from 2005 to 2007

2.5 Consecutive Interpretation as a Performance and Anxiety in Interpreting Studies

Since consecutive interpretation involves public speaking, and interpreters must face their audience and become the speaker when giving the consecutive interpretation, the

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difficulties of public speaking need to be overcome and controlled in order to be able to give a competent interpretation. (Lim, 2018). In this regard, interpreters who are performing consecutive interpretation are very much like music performers. Performers (and interpreters both) go through vigorous training to strive for the "perfect" performance, as if there could be one. This, by itself, creates anxiety. (De Felice, 2004, p.72).

Conference interpreting can be a very stressful activity not least because it involves the performance of a series of complex cognitive and psychomotor operations in public or at least for the public (Ivars, A. J., & Calatayud, D. P., 2001). Anxiety is pervasive in language learning, but it is more so in interpreting training (Dong et al., 2013). An interpreting anxiety scale in three dimensions was developed by Dong et al. to measure the anxiety of interpreting trainees. In writing about how students learn consecutive interpretation, Kuwahata (2005) wrote "… [students] need to learn to cope with a combination of external factors such as stress, anxiety and performance pressures in addition to the developing actual CI skills".

Brisau et al. (1994) considered anxiety a factor to be reckoned with. The distinction between debilitating and facilitating anxiety is important for interpreters, because awareness of these feelings and the potential of the "positive frustration" will be an element of training (Brisau et al., 1994).

Rojo López et al. (2021) from the Translation and Interpreting Degree at the University of Murcia conducted a study on twenty-three final-year students, age range from 21-29, six males and seventeen females. The results generally corroborated the writers' first hypothesis, that the students' grades were negatively correlated with their pre-examination levels of S-anxiety (state anxiety). While Chiang (2010) found trait anxiety to have negative but non-significant relationship with student interpreters' learning outcomes, she also proposed to conceptualize interpretation anxiety as a situation-specific anxiety, for it takes

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into account the interaction between situations and persons while avoiding the shortcomings of construct ambiguities as exemplified by the trait anxiety approach.

With consecutive interpretation, anxiety associated with public speaking also derives from feelings of insecurity or fear related to the result of the task performance (Ivars, A. J., & Calatayud, D. P., 2001). It is an emotional reaction typical of situations of judgement arising from evaluation situations (Calvo & Miguel-Tobal, 1998). As stated in sections above, in professional fields such as sports psychology and music performance, the efficacy of a mindfulness-based intervention showed promising results. This paper aims to explore mindfulness meditation as an intervention to reduce state anxiety during consecutive interpretation.

2.6 Workload and Interpreting Performance

Interpreting is a cognitively demanding task because parallel lexical access to both the source language and the target language are required during comprehension and production in interpreting. While cognitive load measurement has garnered some attention in studies examining interpreting from a cognitive standpoint, there has been limited emphasis on elucidating the fundamental nature of the cognitive load construct. Additionally, existing research predominantly focuses on simultaneous interpreting, with consecutive interpreting receiving comparatively little attention (Chen, 2017). The notion of cognitive load was first introduced to the field of interpreting studies by Gile (1985), aiming to account for the observed information loss in professional interpreters. While originally developed as a pedagogical tool, Gile's Effort Models have transcended their initial purpose and have become widely adopted theoretical frameworks for understanding the cognitive processes involved in interpreting. Since then, a limited number of researchers have studied cognitive load in interpreting. For example, Seeber (2013) defines cognitive load as “the amount of

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capacity the performance of a cognitive task occupies in an inherently capacity-limited system" (p. 19).

Chen (2017) argues that since cognitive load is essentially a theoretical construct, it cannot be observed and measured directly, but we can rely on observable and measurable surrogates that are indicative of cognitive load. One seemingly obvious indicator is the subjective feeling of effort. Subjective rating scales have been infrequently utilized for assessing cognitive load in interpreting. However, these scales have been extensively employed in research on mental workload and Cognitive Load Theory, demonstrating their validity, non-intrusiveness, and ease of implementation. Thus, it is worthwhile to explore the applicability of established rating scales from these fields to interpreting research. In the research paper, Chen introduced some techniques that are potentially useful for measuring cognitive load in consecutive interpreting, including the NASA-TLX, pen recording, and eye tracking.

2.7 Empirical Studies about the Effect of Mindfulness Training as Applied to Interpreting

Ivars and Calatayud (2013) conducted the first study that looked into mindfulness training and interpretation. A large sample size of 371 participants, comprising 327 females and 44 males, all under 25 years old, was involved in the study, which spanned over four years. All participants practiced two techniques, focused attention (breath meditation) and relaxation, during almost daily class sessions. Some days it was meditation, other days it was relaxation, and occasionally no practice at all. At the final test, participants were randomly separated into three groups during their final interpretation exam: guided focused attention group listened to an eight-minute focus-meditation recording; relaxation practice group listened to an eight-minute guided relaxation recording; and control group with no recording,

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just a few words of encouragement from the professor. Anova results showed that there were significant differences between the three conditions, and *t*-test results indicated that the focus-meditation group significantly outperformed the other groups.

Johnson (2016) also explored the efficacy of mindfulness training on students' consecutive interpretation exam performance using Cognitive Load Theory as the theoretical foundation. The sample number was 67, of which 20 in the treatment group were students enrolling in a 1-unit half semester elective fail/pass course on mindfulness training (4-week, 12 hours). The content of this course included four two-hour class session per week and a half-day off-campus silent retreat at a nearby retreat center towards the end of the training. Results showed that the mindfulness group scored higher on the final than on the midterm, while the control group scored lower. The inverse association between mindfulness and stress was strong for treatment group and moderate for the control group. However, contrary to expectation, the quantitative data showed little to no relationship between mindfulness and attention; stress and attention; or any of these variables and interpreting performance. Yet students in the mindfulness group reported strong relationships among all of these variables. Johnson's study was replicated in a Master's thesis by Hsiao (2020) to explore whether the results from the previous study regarding interpreting performance, mindfulness and interpreting anxiety could be applied to various academic systems and cultures in a universal manner. Table 2.3 summarizes previous studies on mindfulness intervention in interpreting studies.

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Table 2.3

Previous Studies on Mindfulness as an Intervention in Interpreting Studies

Study	N	Treatment	Sessions	Results
Ivars and Calatayud (2013)	371	4-yr FM	practiced before each class session	FM group outperformed control groups
Johnson (2016)	67	4-wk MFI	Four 2-hr class One 4-hr silent retreat 10+ min HM daily	MFI group outperformed control group
Hsiao (2020)*	20	6-wk MT	Six 2-hr class One 4-hr silent retreat 10+ min HM daily	No significant difference between groups

Note. FM=Focus-meditation; MFI = Mindfulness for Interpreters; MT=Mindfulness Training; HM=Home Meditation.
*Unpublished Master's thesis

2.8 The Efficacy of *Brief* Mindfulness Inductions

Heppner and Shirk (2018) defined a brief mindfulness meditation or mindfulness induction as "short (approximately 20 min or less) single-session inductions." For mindfulness activities with a duration of one week or less, they suggest naming them brief mindfulness trainings, and mindfulness-based therapies for strategies that are eight to twelve sessions spread out over weeks. Table 2.4 compares the duration, repetition, and naming of different mindfulness activities as suggested by Heppner and Shirk.

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Table 2.4

Definitions of Different Durations of Mindfulness Activities

Duration	Repetition	Naming
20-min or less	No	brief mindfulness meditation/induction
1 wk or less	Yes	brief mindfulness training
8- to 12-wk	Yes	mindfulness-based therapy

They looked at brief mindfulness inductions across different realms, such as cognition and perception, emotion regulation, social behaviors and processes and physical health indicators and health behavior modification. Heppner, Groark, and Nix (2017) found that a five-minute mindful eating task administered through headphones resulted in faster reaction times in a traditional Stroop task compared to a time-matched control audio task of listening to a feel-good news story. Wenk-Sormaz (2005) compared a meditation group, an active cognitive control group and a mind-wondering group, and found that a twenty-minute breathing-focused meditation reduced habitual responding. In Hafenbrack et al. (2014), a fifteen-minute focused breathing exercise, compared to a mind-wandering task, let to reduced sunk cost bias. Lueke and Gibson (2015) found that a ten-minute induction which focused listeners on bodily sensations without judgment led to reduced implicit race and age bias compared to a story-listening group. Finally, Cleirigh and Greaney (2015) also demonstrated the efficacy of a brief mindfulness induction with a brief ten-minute mindfulness induction that improved group decision-making in a group task performance compared to a time-matched control. Aside from these studies, a meta-analysis assessing the effects of brief mindful attention induction on cognition of 34 studies by Gill et al. (2020) also obtained results that suggest mindfulness induction improves cognitive performance in tasks involving complex higher-order functions.

The efficacy of a brief mindfulness induction to enhance interpretation performance or mitigate interpretation anxiety has yet to be examined. Arguably, the anxiety level might

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be high for interpreters because language conversion needs to happen on the spot and most of the time interpreters do not have access to the speech in advance. This is different for some athletes and musicians who practice a set routine and the efficacy of their performance hinges on how well the routine is delivered. Nevertheless, studies have shown that brief mindfulness inductions improve sports and musical performance, yet we do not know if the same can be found in interpretation. Johnson (2016) wrote in her dissertation regarding participants' attendance to the mindfulness practices in her Pilot 1, "Scheduling, continuity and duration clearly presented the biggest obstacles to regular attendance and practice" (p. 83). In a study about the effects of meditation on attention processes (attentional capacity, cognitive flexibility, cognitive style) and whether effects were transitory or stable, Rani and Rao (2000) found that meditation's effects on attention tasks are better felt soon after meditating. Citing this reference, Ivars and Calatayud (2013) inferred that "effects on a highly demanding cognitive task, such as interpreting, can be perceived even after a short practice in novel meditators, therefore providing them with a cognitive tool that can be used in the classroom settings." For that matter, this tool can potentially be useful for any interpreter trainee or professional interpreter to mitigate anxiety before an interpreting task.

Therefore, if a positive correlation can be found between a brief mindfulness induction and interpretation performance, a short mindfulness meditation can serve as a pragmatic and convenient way for interpreter trainees and interpreters alike to regulate anxiety before an interpretation exam or assignment.

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Chapter 3 Methods

This chapter will introduce the different research methods used in the study. This study adopted a mixed-methods, between-subject, quasi-experimental repeated measures design to examine the efficacy of a brief mindfulness induction on lowering the anxiety level and workload of interpreter trainees' consecutive interpretation, and whether the interpretation performance would improve subsequently. Both quantitative and qualitative data were collected from each participant. The quantitative data included the state anxiety score from the State-Trait Anxiety Inventory (STAI), workload score from NASA Task Load Index (NASA-TLX) and CI performance score. The qualitative data included the content of a semi-structured retrospective interview at the end of the experiment procedure and my observation of the participants during the induction or idle time. This chapter describes the participants of the study, the two questionnaires used for gathering the quantitative data, the creation of stimuli materials, the experiment procedure, and how CI performance was evaluated.

3.1 Participants

This study recruited two interpreter trainees from year-four of a graduate school to take part in the pilot study and ten from year-two of the same school to take part in the formal study. One participant's data were missing due to experimenter error, so this participant and another one from the other group who had the same trait anxiety score were both dropped from further analysis. The remaining eight participants in the formal study as well as the two participants in the pilot were all students from the same graduate program of translation and interpretation in the north of Taiwan. Participants were invited either in person or made aware of the recruitment through after class announcement and joined the study on a voluntary basis. All participants had a Chinese A, English B combination and had completed

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at least a basic CI course from English to Chinese. The participants were evaluated by the same instructor and received a grade of A- or above in the CI course. All participants received $500 cash coupon for participating in either the pilot or the formal study.

All participants in the experiment, whether in the pilot or the formal study, filled out the Y-2 form (trait anxiety) of the STAI questionnaire (see Appendix F) before being divided into the experimental group or the control group. For the pilot experiment, two year-four students were chosen because they were from the same school year and their Y-2 scores (trait anxiety) of the STAI questionnaire were close, one was 66 and the other one was 62. The participant with the Y-2 score of 66 was randomly assigned to the experimental group, and the participant whose Y-2 score was 62 was assigned to the control group.

For the formal study, participants' scores of form Y-2 of the STAI questionnaire were collected and used as a benchmark to be divided into two groups of equal mean value of tallied scores. Each participant's score and the total, mean and SD can be found in Table 3.1. The control group's mean score was 45.25 while the experimental group's mean score was 44.5. A Mann-Whitney U test was conducted using JASP, an open-source free graphical software package for basic statistical procedures (Love et al., 2019), with the aim of determining if the two means are statistically different. The test result showed that $u = 7.5$, $p = 1$. By conventional criteria, this difference is considered to be not statistically significant.

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Table 3.1

Participant Groupings with their Mean and SD of Trait Anxiety Scores

	Control	Experimental
Participants' Y-2 scores (N=8)	C1 29 C2 34 C3 54 C4 64	E1 34 E2 41 E3 46 E4 57
Total	181	178
M (SD)	45.25 (14.3)	44.5 (8.38)

3.2 Stimuli Materials

Two English speeches from the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change were chosen as the stimuli. Both are about the topics of carbon reduction and energy transformation. These topics were chosen because climate change and energy are two of the most prominent themes of international conferences and repeatedly practiced by students in consecutive interpreting classes. The decision to keep two speeches in the same language was to avoid the effect of directionality, since interpreting into different language direction imposes different cognitive loads and creates excessive stress (Pochhacker, 2015, p. 109). The chosen speeches were then edited with respect to length and complexity, making them as comparable as possible. The edited speeches were analyzed using CPIDR (Computerized Propositional Idea Density Rater), a computer program that could automatically determine the propositional idea density (Brown et al., 2008). The results in Table 3.2 showed that the two speeches were similar in the number of propositions and words as well as idea density.

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Table 3.2

Speech Analysis Results

	Proposition count	Word count	Idea density
Speech 1	198	421	0.470
Speech 2	200	424	0.472

Each speech was then divided into two long segments that were around 60 to 120 seconds in duration, and two short segments that were around 45 seconds in duration. As defined by Setton and Dawrant, segments that are around 30 seconds are short consecutives, and segments around 60 to 90 seconds are medium-length (2016, pp. 136-137). Table 3.3 depicts the length of each segment of speech 1 and speech 2. For the scripts of the two speeches, see Appendix A. In the formal study, two participants out of the experimental group or the control group interpreted speech 1 first and the other two participants interpreted in the reverse order to avoid practice effect. The purpose was also to ensure that raters were blind to which speech was performed first when they assessed each participant's CI to avoid bias in the process of rating.

Table 3.3

Length of Experimental Materials

	Speech 1	Speech 2
Segment 1	0:46	0:45
Segment 2	1:55	1:58
Segment 3	1:05	0:57
Segment 4	0:50	0:50
Total (min)	4:40	4:30

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3.2.1 Recording of Stimuli

The two speeches used as stimuli were video recorded by the same female native speaker of English using an iPad and a RØDE microphone. The decision to use a video recording instead of an audio recording was because a visual would be more authentic of a conference setting. The speaker was given guidance about target speed and instructed to read the text in a formal manner as if giving a speech in an international conference to ensure consistency in the tone and manner of delivery for both speeches. As a result, both speeches were controlled at about 90-100 words per minute and did not need to be artificially adjusted afterwards. The two videos were edited to have four segments each, two long ones and two short ones as mentioned in the previous section. On-screen text of "Please Interpret" was inserted at the end of the first, second and third segment to prompt the participant to start interpreting.

3.3 Data Collection

The experiment gathered two distinct sets of questionnaires data, one to measure anxiety levels (STAI) and the other to assess perceived workload (NASA-TLX), to get a full picture of how participants felt and how much mental effort they exerted during the two consecutive interpretation tasks.

3.3.1 State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI) is a commonly used self-rated questionnaire of trait and state anxiety (Spielberger et al., 1971). The reason for selecting this assessment was its widespread use in the research, and its capacity to rapidly and efficiently evaluate the current degree of anxiety that the participants are going through. The STAI was also utilized in various interpreting studies to gauge the level of anxiety experienced by the

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participants. It was administered by Korpal (2016) to examine whether the speed of speaker's delivery influences the level of stress experienced by interpreting trainees performing a task of simultaneous interpreting. Ivars, A. J., & Calatayud, D. P. (2001) measured general state anxiety in interpreting students using the STAI questionnaire. In Chmiel and Spinolo (2022), participants completed the STAI Y-2 and STAI Y-1 (as a baseline state measurement) at the beginning of the experiment, before any task, and then the STAI Y-1 after interpreting each of the experimental texts.

Form Y-1 consists of twenty items that measure one's state anxiety, and form Y-2 contains twenty items that measure one's trait anxiety. Participants were asked to respond how much each statement resonates with how they felt at the moment. Each item is rated along a 4-point Likert scale (State: 1 = Not at All, 4 = Very Much So; Trait: 1 = Almost Never, 4 = Almost Always), and refer to both positive and negative states. For example, question three states "I feel tense," and question eleven states "I feel self-confident." See Appendix F for the list of questions from both questionnaires.

The inventory was found to be a highly reliable measure (Metzger, 1976). In the current study, participants' results of form Y-2, which measures the trait anxiety level, were used as benchmark to divide them into the control and experimental groups, see Table 3.1 for participant groupings with the mean and SD of trait anxiety scores of each group. Form Y-1 (state) was used to assess the participants' state anxiety level after each CI was performed.

3.3.2 NASA Task Load Index (NASA-TLX)

NASA-Task Load Index (TLX) is a self-rated assessment tool that rates perceived workload. It was developed by the Human Performance Group at NASA's Ames Research Center over a three-year development cycle that included more than 40 laboratory simulations (Hart, 2006). Information about the magnitude and sources of six workload-

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related factors (Mental Demand, Physical Demand, Temporal Demand, Performance, Effort and Frustration) are converted into a multidimensional rating scale that represents a reliable estimate of workload (Hart & Staveland, 1988). The weight of a subscale is determined by the number of times it is selected, and this method is used to account for individual variations. Additionally, participants are required to rate each subscale by assigning a score that reflects the amount of burden they experienced while performing the task.

The NASA-TLX is traditionally done with pen and paper, but a computerized iPad version (1.0) is also available for free download from the Apple App Store[1]. Chen (2017) conducted an exploratory study with five professional interpreters and found that the average time needed to complete the computerized NASA-TLX is under 10 minutes. In the current study, the longest time a participant took to complete the questionnaire was 12 minutes, and the shortest was 1 minute and 30 seconds. Chen (2017) suggested that both consecutive and simultaneous interpreting can be assessed using the NASA-TLX, and the evaluation should be carried out promptly after the interpreting task. In the current study, participants filled out the questionnaire using an iPad immediately following the interpreting task.

A study was set up by the researcher before the experiment. In the settings section, Study Name, Study Group (optional) and Subject ID was entered before each participant arrived. The first page of the questionnaire displayed the participant's ID and trial number (Figure 3.1). After clicking start, participants would see a brief instructions page explaining by whom the evaluation was developed, and that the questionnaire assesses the relative importance of six factors in determining how much workload one experienced while performing a task that was recently completed by the questionnaire taker. The instructions also said those six factors are defined on the following page and advised the questionnaire

[1] NASA. (1988, 2009, 2016). NASA TLX (Version 1.0.3) [Mobile app]. Apple App Store. https://apps.apple.com/us/app/nasa-tlx/id1168110608

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taker to read through them to make sure one understands what each factor means (Figure 3.2). However, it was not possible to go back to the definition page once the questionnaire started. Upon the suggestion of a pilot participant, the definitions of the six workload-related factors were typed out and printed on an A4 paper as a handout sheet for participants when they filled out the NASA-TLX questionnaire. See Appendix D for the handout sheet of the definitions of six workload-related factors.

Figure 3.1

First Page of NASA-TLX Questionnaire

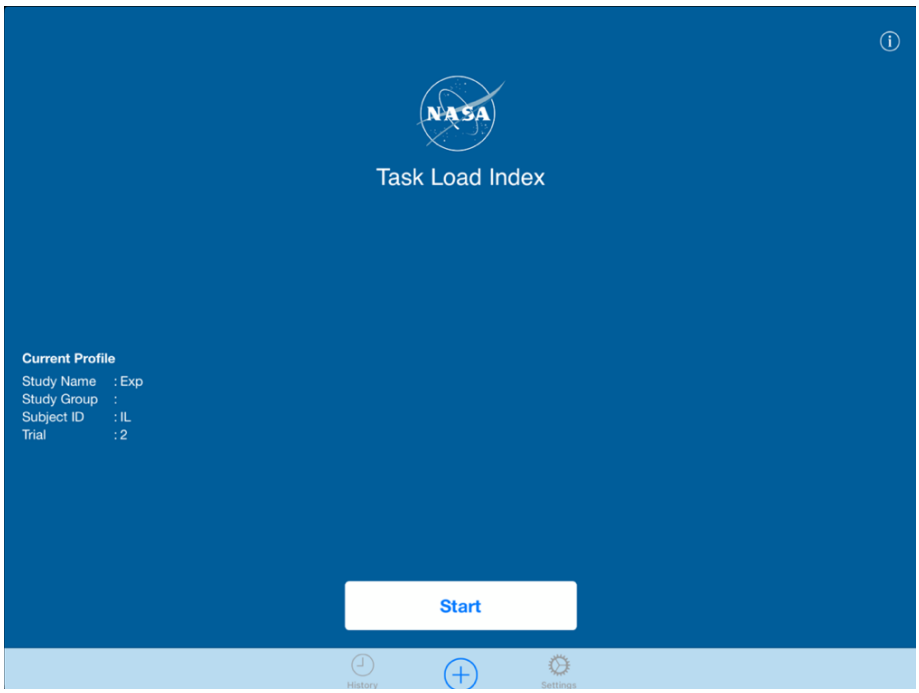

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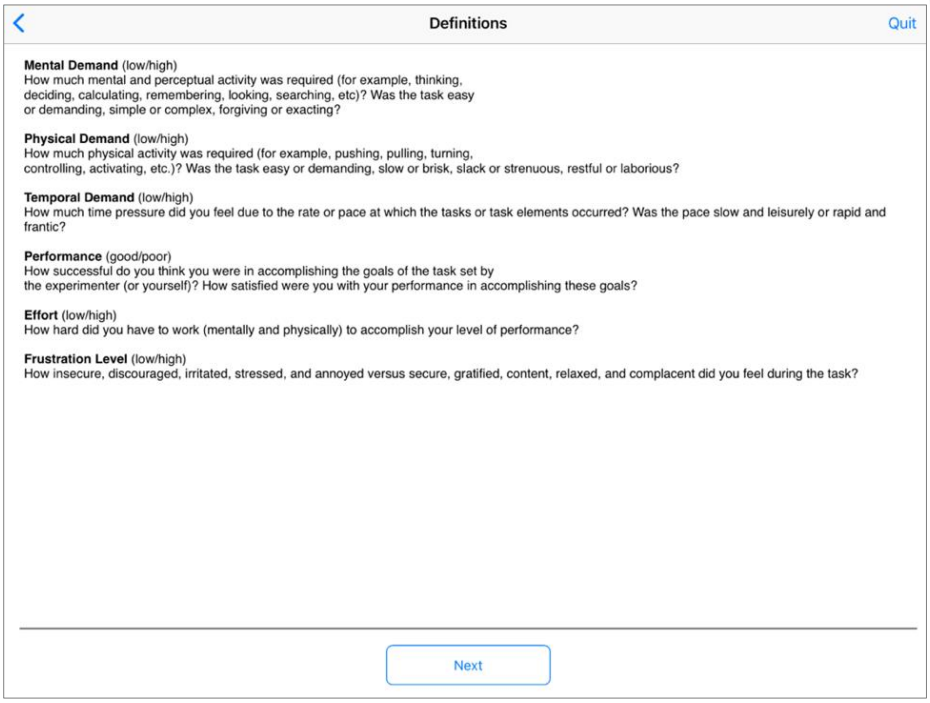
Figure 3.2

Definitions of Six Workload-related Factors



3.4 Induction Material

Considering the fact that all participants are native speakers of Chinese, the researcher decided the induction material should be in Chinese for the ease of following instructions. The twelve-minute guided breathing meditation exercise was a 12-minute audio recording by Te-Chung Chen (陳德中)[2], a certified Mindfulness Based Stress Reduction (MBSR) instructor who had studied under Jon Kabat-Zinn (founder of MBSR program) and a licensed psychologist with over 20 years of experience in mindfulness meditation.

The instruction started by inviting the listener to find a quiet place to sit down, either on a chair or a yoga mat. Whether it's on the chair or on the floor, the most important thing is to establish oneself in a posture that embodies wakefulness and dignity. Next, the listener was

[2] Founder of Taiwan Mindfulness Center 台灣正念工坊 and translator of 《正念減壓初學者手冊》 (*Mindfulness for Beginners: Reclaiming the Present Moment and Your Life)*, Kabat-Zinn, J. (2012).

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encouraged to practice focusing on the breath, paying attention to the inhalations and exhalations. The listener was told that it was natural if the mind wonders, no need to reprimand oneself if this happened. Two parts of the recording, one minute from 6:33 and one and half minute from 9:55, were deliberately left without instructions for the listener to practice on their own. For a transcript of the audio with time code, see Appendix C.

The track used as induction material is available on YouTube with visuals of natural landscapes. The researcher downloaded the clip locally and edited the visual of the video to be all black, keeping the visual stimuli to a minimum. Participants in the experimental group played the video clip with black screen only and listened to the audio on a laptop with a headset and practiced the twelve-minute guided breathing exercise following the instruction. This was done in a separate room other than the one where they performed the consecutive interpretation.

3.5 Experiment Procedure

The researcher performed the study individually with each participant, and explained the experiment procedure according to their group when participants arrived. Consent forms (see Appendix G) that outlined the study's subject matter, duration, and procedures were then signed by both parties. Additionally, the form included the researcher's name and a declaration that any data gathered would be stored on a computer with passcode lock and exclusively used for the study's objectives. The participants were informed verbally again about the procedure and that their CI performance would be video and audio recorded for assessment.

Participants were divided ahead of time before the experiment into the experimental and the control groups based on their trait anxiety results (see Table 3.1 for participants groupings). Each participant from both groups interpreted the two prepared speeches. As

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stated in 3.2, two participants from each group interpreted speech 1 first and the other two interpreted in the reverse order. Before each interpretation task, participants were provided with a summary sheet including information about the original speaker, date, and occasion along with several key terms and their translation (see Appendix B). Participants were also told that they could take as much time as they needed to finish interpreting one segment of the speech.

After signaling that they were ready, the video recording was played and participants interpreted the first speech. After the first interpreting task was completed, participants first filled out STAI form Y-1 (state) and then NASA-TLX. This was because parts of NASA-TLX requires participants to compare multiple pairs of workload-related factors, more consideration was needed on the participants' part. Therefore, instead of coming into a long questionnaire right after the first interpretation task, I decided to have participants fill out the shorter STAI form Y-1 first. To avoid respondent fatigue, participants filled out STAI form Y-1 (state) first after the first interpreting task, and NASA-TLX first after the second interpreting task.

When the two questionnaires were filled out after the first interpreting task, participants in the experimental group were led to a different room to practice the twelve-minute guided mindfulness breathing meditation, using a laptop and a headset. Participants in the control group were led to the same room and were told to rest twelve-minute before the next interpreting task. Both the mindfulness breathing meditation practice and the wait took place in the same room that was different from the one where participants performed CI. During the Pilot experiment, the control group participant was seated at the same seat where the participant from the experimental group sat, where the laptop playing the induction material was stationed. Although the control group participant was instructed to rest, the presence of the laptop was seen as an experimental apparatus and this participant proceeded

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to use the laptop immediately upon entering the room. In the formal study, I cleared the laptop and the headset from the table before participants from the control group entered the room to avoid confusion.

After the twelve-minute mindfulness breathing meditation or rest time was over, participants from both groups were directed back the first room to interpret the second speech. An information sheet containing the original speaker, date, and occasion as well as key terms in English and Chinese was provided before the video recording was played. When the second interpretation task was completed, the same two questionnaires were filled out in the reverse order. Participants' first and second CI performances were both video and audio recorded for assessment by raters.

At the end of the experiment, a semi-structured retrospective interview was carried out with participants from both the experimental and the control group. The interview was audio recorded for analysis. Finally, the participants were thanked and received compensation of $500 cash coupon for participating in the study before they left the room. Notes produced from the two interpreting tasks were not collected or discarded by the researcher. See Figure 3 for the sequence of experiment.

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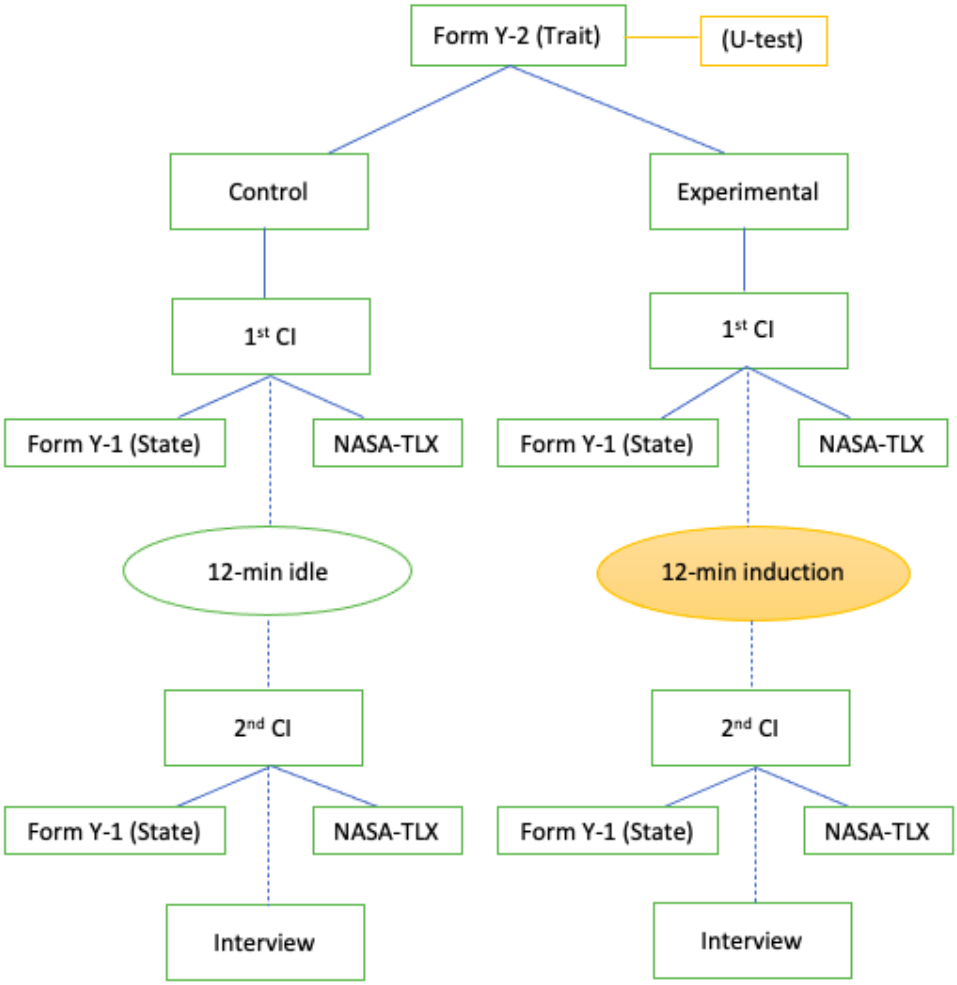
Figure 3.3

Sequence of Experiment



Note. CI = Consecutive Interpretation

3.6 Data Collection

Results of the two questionnaires were collected after each interpretation task as well as the following data:

3.6.1 CI Performance Score

Participants' CI performances were video and audio recorded and evaluated by two raters based on Consecutive Interpretation Rating Scales, a standardized two-part scale

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developed for Taiwan's English and Chinese Translation and Interpretation Competency Examination under the auspices of the Taiwan Ministry of Education (Liu, 2013). For criteria of accuracy and delivery, see Table 3.4 and Table 3.5. Both raters were third-year students at a graduate program of translation and interpretation in the north of Taiwan. They were chosen as raters because both had displayed exceptional knowledge and skill in consecutive interpretation. Rater training was conducted before the rating process began to enhance interrater reliability. During rater training, participants were provided with clear instructions, guidelines, and examples to standardize their scoring or rating process. Both raters were present during rater training session and the final rating was done in a single rating session. The order or the recordings was randomized during the rating session.

Table 3.4

The LTTC Criteria for Assessment on Accuracy

Score	Description
5	The message in the interpretation is the same as that in the original speech. It contains no errors.
4	The message in the interpretation is similar to that in the original speech. It contains one or two minor errors.
3	The message in the interpretation is slightly different from that in the original speech. It contains one major error or many minor errors.
2	The message in the interpretation is very different from that in the original speech. It contains two or more major errors.
1	The message in the interpretation is completely different from that in the original speech.
0	No interpretation is produced.

Note. Reprinted from Liu, M. (2013). Design and analysis of Taiwan's interpretation certification examination. In D. Tsagari & R. van Deemter (Eds.), *Assessment issues in language translation and interpreting (pp. 163-178).* Frankfurt: Peter Lang.

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Table 3.5

The LTTC Criteria for Assessment on Delivery

Score	Description
5	The interpretation is fully comprehensible and very coherent with few instances of hesitation, repetition, self-correction, and redundancy. It contains few inappropriate usages of grammar or terms.
4	The interpretation is mostly comprehensible with some instances of hesitation, repetition, self-correction, and redundancy. It contains some inappropriate usages of grammar or terms.
3	The interpretation is generally comprehensible but is not very coherent and has many instances of hesitation, repetition, self-correction, and redundancy. It contains many inappropriate usages of grammar or terms.
2	The interpretation can be understood with great difficulty.
1	The interpretation cannot be understood at all.
0	No interpretation is produced.

Note. Reprinted from Liu, M. (2013). Design and analysis of Taiwan's interpretation certification examination. In D. Tsagari & R. van Deemter (Eds.), *Assessment issues in language translation and interpreting (pp. 163-178).* Frankfurt: Peter Lang.

3.6.2 Semi-structured Retrospective Interview

After the second interpreting task was completed and two questionnaires were filled out, participants received a semi-structured retrospective interview. The questions focused on the following aspects:

1) the perceived difficulty and topic familiarity with the speeches;

2) participants' feelings during the induction or rest time;

3) the potential effect of the induction or rest time on their performance of the second interpretation task;

4) prior experience with meditation;

5) measures for mitigating anxiety before an interpretation task.

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A list of interview questions can be found in Appendix E. When participants were asked to reflect on their feelings during the induction or wait time, the questions included, for example, whether they fell asleep during the induction. As suggested by Wenk-Sormaz (2005), participants were also asked to rate their effort on following the directions throughout the twelve-minute guided breathing exercise on a scale of 1 to 7 (1 represents no effort and 7 represents full effort). For the control group, the questions were also combined with my observation of the participants during the wait time.

3.7 Data Analysis

Group means of state anxiety level, workload, and CI performance score for both groups were analyzed. The first and second analyses examined group means of state anxiety score and workload score pre- and post-test. Mann-Whitney U tests were conducted to determine if there is a significant difference between the means of the experimental and the control groups. The impact of mindfulness induction on CI performance was analyzed by comparing group means of their second interpreting task. Additionally, participants' Y-2 (trait anxiety) scores were arranged from the highest to the lowest, with four participants with the highest Y-2 scores artificially grouped by the researcher and labeled as "High Anxiety" and the other four labeled as "Low Anxiety." Group means of state anxiety level, workload, and CI performance score were again analyzed with these two groups. Both descriptive statistics and inferential statistics were used to analyze the data. Data analyses was conducted using JASP, an open-source free graphical software package for basic statistical procedures such as *t* tests, ANOVAs, linear regression models, and analyses of contingency tables (Love et al., 2019). Finally, individual participants' Y-1 (state anxiety) and NASA-TLX scores from both groups pre- and post-test were also analyzed.

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Chapter 4 Results

This chapter presents both the quantitative and qualitative data collected in the study. To address the three research questions introduced in the first chapter, this chapter will organize the data into two subsections: 1) demonstrating the impact of mindfulness breathing exercises or rest on anxiety levels and perceived workload, by comparing participant group means of Y-1 (state) and NASA-TLX (workload) from the first and second tests. Embedded within these sections are insights obtained during the retrospective interview process. 2) Describing individual results of anxiety levels, perceived workload, and CI performance during the first and second tests. Finally, the chapter depicts findings from the data when participants are regrouped based on their trait anxiety scores.

4.1 Group Results

This section depicts the group means of state anxiety, perceived workload and CI performance of the experimental and the control groups.

4.1.1 State Anxiety

Participants from both groups filled the STAI Form Y-1 (state anxiety) after each interpreting task. All participants took less than two minutes to finish filling out the questionnaire on both occasions. Questionnaires were collected and scores calculated according to the scoring key, which is included in the State-Trait Anxiety Inventory for Adults™ Instrument and Scoring Key, legally purchased by the researcher from Mind Garden, Inc. online. Different scoring weights were shown on the response category. For example, for Question 1, if the respondent marked 3 (Moderately So), then the weight would be 2. The range of possible scores for both form Y of the STAI varies from a minimum score of 20 to a maximum score of 80 on both the Y2 (trait) and Y-1 (state) subscales. STAI scores

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are commonly classified as “no or low anxiety” (20-37), “moderate anxiety” (38-44), and “high anxiety” (45-80) (Kayikcioglu, O., Bilgin, S., Seymenoglu, G., & Deveci, A., 2017).

Two participants asked the researcher to define “jittery” from “I am jittery” from Question 13, as they were unclear about the difference between “jittery” and “nervous”. The researcher gave the definition (jittery: nervous and unable to relax) and these two participants resumed filling out the questionnaire. Table 4.1 displays all participants’ Y-1 scores. Y-1-1 represents their scores after the first interpreting task, and Y-1-2 represents their scores after the second interpreting task.

Table 4.1

Participants’ Y-1 Scores

ID	Y-1-1	Y-1-2
C1	56	43
C2	32	33
C3	63	70
C4	43	48
E1	41	42
E2	66	52
E3	56	44
E4	48	46

Note. C = Control E = Experimental

Group means before and after the induction or rest time can be found in Table 4.2. The mean score for the control group before and after the rest time was the same, 48.5. The mean score for the experimental group before the induction was 52.75, and 46 after the induction. Figure 4.1 shows the groups means before and after the induction or rest time. The blue line indicates the experimental group and the orange line indicates the control group. As Figure 4.1 demonstrates, the mean score of Y-1 from the experimental group decreased after

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the induction, while the mean score from the control group remained the same. There were no significant differences found between the control and the experimental group at the second test (u = 8, p = 1). No differences were found among the participants in the experimental group (z = 1.5, p = 0.3) nor among those in the control group (z = -0.4, p = 0.9). However, a trend in which a 12-minute mindfulness breathing exercise reduced the experimental state anxiety level of group participants can be observed.

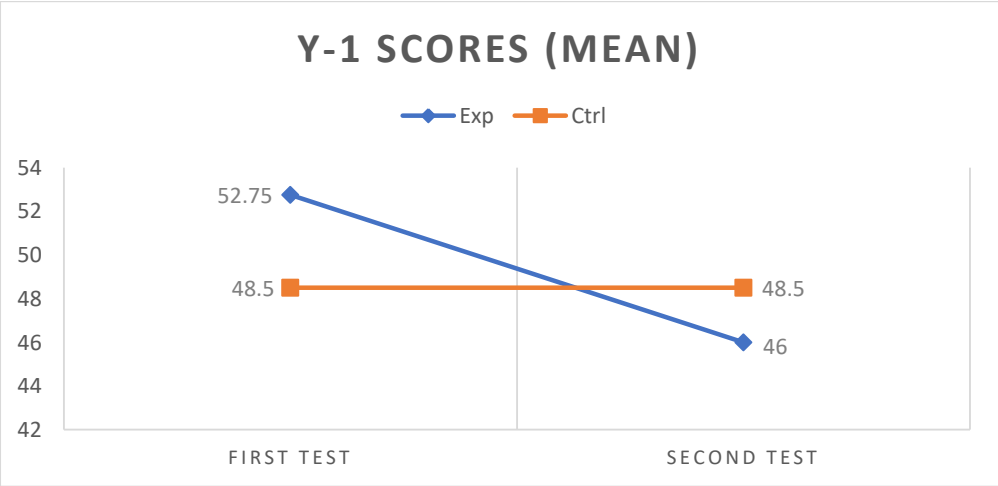
Table 4.2

Descriptive Statistics of Participants' Y-1 Scores

	Y-1-1		Y-1-2	
	Control	Experimental	Control	Experimental
Mean	48.5	52.75	48.5	46
Std. Deviation	13.772	10.751	15.631	4.32
Minimum	32	41	33	42
Maximum	63	66	70	52

Figure 4.1

Group Means of State Anxiety



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4.1.2 Workload

Participants from both groups filled out the NASA-TLX questionnaire on an iPad to evaluate their perceived workload after each interpreting task. Table 4.3 demonstrates participants' NASA-TLX scores before and after the induction/rest time, with NASA1 representing the result after the first interpreting task and NASA2 representing the result after the second interpreting task.

Table 4.3

Participants' Workload Scores

ID	NASA1	NASA2
C1	68.33	56.33
C2	41	48.67
C3	90.67	95
C4	58	74.67
E1	61	52
E2	77.33	54
E3	52.67	53
E4	62.33	66.33

Note. C = Control E = Experimental

Table 4.4 is a summary of descriptive statistics. Control group's mean score before rest time was 64.5 and 68.67 after rest time. The mean score of the experimental group before induction was 63.33, and after induction was 56.33.

doi:10.6342/NTU202304434

Table 4.4

Descriptive Statistics of Participants' NASA-TLX Scores

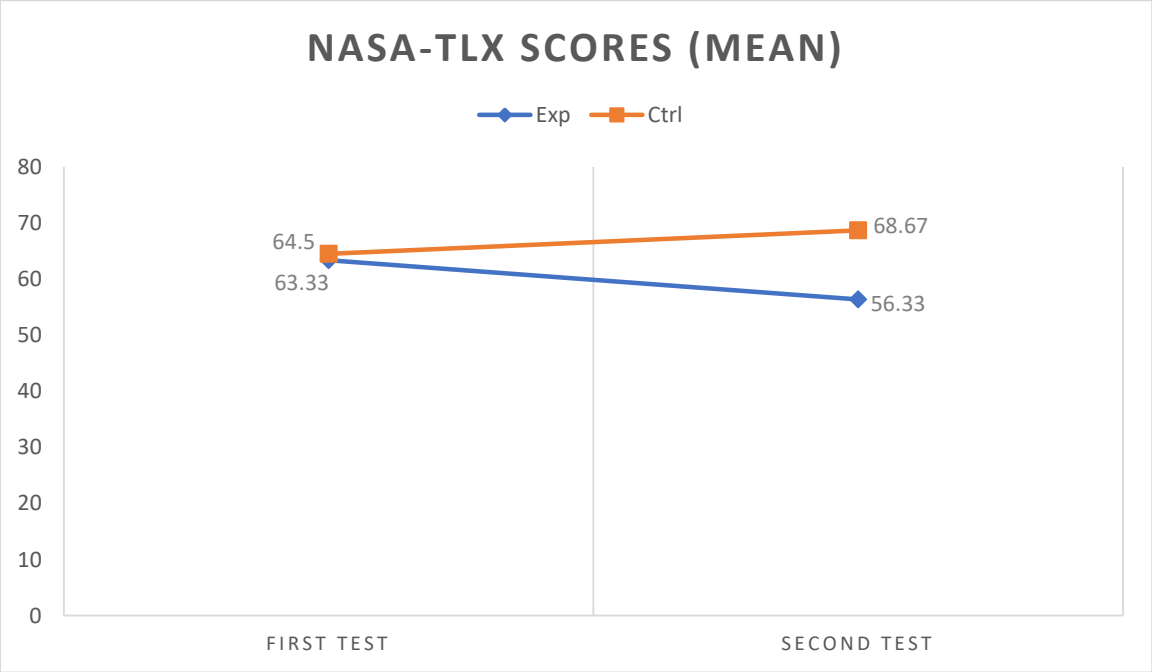
	NASA1		NASA2	
	Control	Experimental	Control	Experimental
Mean	64.5	63.33	68.67	56.33
Std. Deviation	20.769	10.264	20.668	6.715
Minimum	41	52.67	48.67	52
Maximum	90.67	77.33	95	66.33

Group means of NASA-TLX scores for both the experimental and the control group are displayed in Figure 4.2. The blue line indicates the experimental group and the orange line indicates the control group. As Figure 4.2 demonstrates, the mean score of NASA-TLX of the experimental group decreased slightly after the induction, while the mean score of NASA-TLX of the control group increased slightly after rest. No notable distinctions were observed between the control and experimental groups (p = 0.5). Similarly, no variations were detected among the participants in the experimental group (z = 0.7, p = 0.6), nor among those in the control group (z = -0.7, p = 0.6). However, there is an observable trend which shows that a 12-minute mindfulness breathing exercise reduces the experimental group participants' perceived workload for the second test, while resting did not.

doi:10.6342/NTU202304434

Figure 4.2

Group Means of NASA-TLX Scores



4.1.2.1 Ratings of Six Workload-related Factors

This section described ratings of each of the six workload-related factors from both the experimental group and the control group. In Table 4.5, the descriptive statistics of the experimental group showed that mental demand and effort demand were higher than other demands. After the induction, mental demand, performance demand, effort demand and frustration demand decreased. The differences of ratings from the first and the second test for each factor were not significant (Table 4.6).

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Table 4.5

Descriptive Statistics of Experimental Group's Ratings of Six Workload-related Factors

Workload-related Factors	Mean	Std. Deviation	Minimum	Maximum
Mental 1	73.75	16	60	90
Mental 1	65	10	60	80
Physical 1	22.5	15	15	45
Physical 2	22.5	25	10	60
Temporal 1	48.75	19.738	25	65
Temporal 2	48.75	19.311	20	60
Performance 1	46.25	15.478	25	60
Performance 2	37.5	6.455	30	45
Effort 1	67.5	11.902	55	80
Effort 2	66.25	8.539	55	75
Frustration 1	62.5	15	55	85
Frustration 2	52.5	18.484	30	75

Table 4.6

Experimental Group's Paired Samples T-Test

Measure 1	Measure 2	W	z	p
Mental 1	Mental 2	3.000	1.342	0.371
Physical 1	Physical 2	6.000	0.365	0.850
Temporal 1	Temporal 2	6.000	0.365	0.854
Performance 1	Performance 2	5.000	1.069	0.423
Effort 1	Effort 2	2.000	0.447	1.000
Frustration 1	Frustration 2	4.000	0.535	0.789

Note. Wilcoxon signed-rank test.

For the control group, mental demand and effort demand were also higher than other workload-related factors (Table 4.7). Contrary to the results of the experimental group, the control group's mental demand, performance demand and frustration demand of the second test increased. The differences of the control group's first and second tests were not significant either (Table 4.8).

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Table 4.7

Descriptive Statistics of Control Group's Ratings of Six Workload-related Factors

Workload-related Factors	Mean	Std. Deviation	Minimum	Maximum
Mental 1	80	7.071	75	90
Mental 1	87.5	9.574	75	95
Physical 1	35	43.78	5	100
Physical 2	37.5	36.629	5	90
Temporal 1	53.75	30.923	15	90
Temporal 2	32.5	19.365	15	60
Performance 1	48.75	34.731	25	100
Performance 2	51.25	29.545	30	95
Effort 1	68.75	29.545	25	90
Effort 2	68.75	28.395	30	90
Frustration 1	48.75	39.66	15	100
Frustration 2	57.5	33.789	20	100

Table 4.8

Control Group's Paired Samples T-Test Paired

Measure 1	Measure 2	W	z	p
Mental 1	Mental 2	0.000	-1.604	0.181
Physical 1	Physical 2	2.000	-0.535	0.789
Temporal 1	Temporal 2	3.000	1.342	0.371
Performance 1	Performance 2	3.500	-0.548	0.713
Effort 1	Effort 2	3.000	0.000	1.000
Frustration 1	Frustration 2	0.000	-1.604	0.174

Note. Wilcoxon signed-rank test.

A visual comparison of group difference (mean of the six workload-related factors) can be seen in Figure 4.3. Mental demand was the highest for both groups, and the experimental group's second rating of the mental demand went down, while the control group's second rating went up. The same trend could be observed in the frustration demand.

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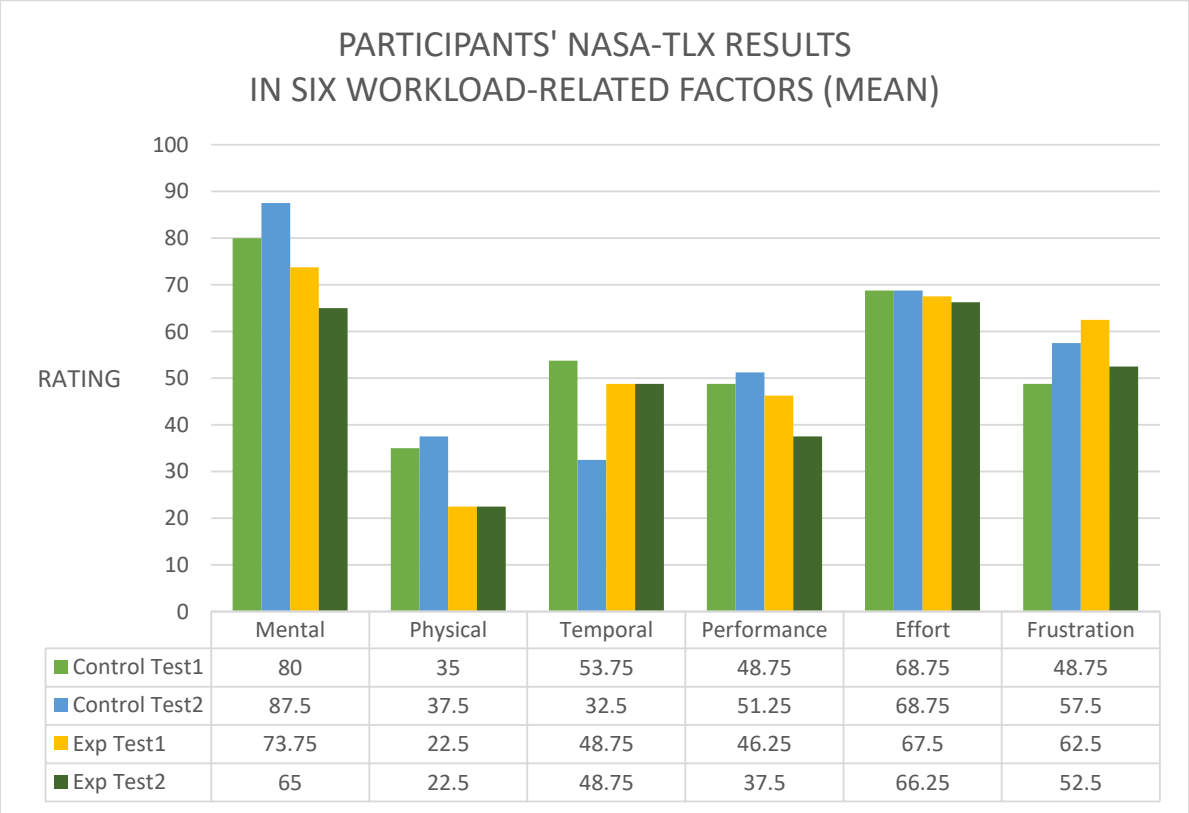
Figure 4.3

Comparison of the Results from the Control Group and the Experimental Group



	Mental	Physical	Temporal	Performance	Effort	Frustration
Control Test1	80	35	53.75	48.75	68.75	48.75
Control Test2	87.5	37.5	32.5	51.25	68.75	57.5
Exp Test1	73.75	22.5	48.75	46.25	67.5	62.5
Exp Test2	65	22.5	48.75	37.5	66.25	52.5

4.1.3 CI Performance

The evaluation of the accuracy and delivery of participants' consecutive interpreting performance was conducted based on the criteria used by LTTC (see Tables 3.5 and 3.6). Each speech was broken into 11 segments that cohesively formed an idea for assessment. Accuracy and delivery of each segment were assessed separately. The score of each segment were added up as the total score of accuracy or delivery of the speech.

Rating was done in a single session with both raters on site and raters worked independently without knowing the scores given by the other rater. Before the rating session started, rater training was conducted to improve interrater reliability. Raters were blind to the order of the speech in which participants performed the interpreting task, so that bias in rating could be avoided.

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Table 4.9 shows the results of all participants' accuracy and delivery of Speech 1 rated by Rater T and Rater B. Descriptive statistics in Tables 4.10 and 4.1 depict the mean, SD, minimum and maximum scores in the category of accuracy and delivery of Speech 1 from both groups given by two raters.

Table 4.9

CI results – First Speech

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
C1	43	41	46	46
C2	42	46	51	52
C3	29	29	35	33
C4	48	46	48	47
E1	35	39	38	40
E2	39	42	47	44
E3	49	48	52	50
E4	34	39	45	46

Note. C = Control E = Experimental

Table 4.10

Descriptive Statistics of Speech 1 rating result – Control Group

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
Mean	40.5	40.5	45	44.5
Std. Deviation	8.103	8.021	6.976	8.103
Minimum	29	29	35	33
Maximum	48	46	51	52

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Table 4.11

Descriptive Statistics of Speech 1 rating result – Experimental Group

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
Mean	39.25	42	45.5	45
Std. Deviation	6.85	4.243	5.802	4.163
Minimum	34	39	38	40
Maximum	49	48	52	50

The intraclass correlation (ICC) is a correlation coefficient that assesses the consistency between measures of the same class (Field et al., 2012). It is a common measure of inter-rater reliability and consistency. Intraclass correlation between Rater T and Rater B of their ratings of speech 1 was calculated using JASP. As shown in Table 4.12, for speech 1, the ICC coefficient of accuracy is 0.899 and the ICC coefficient of delivery is 0.958, both are above the excellent level according to guideline provided by Koo and Li (2016).

Table 4.12

Speech 1 Intraclass Correlation

Type	Category	Point Estimate	Lower 95% CI	Upper 95% CI
ICC3,1	Accuracy	0.899	0.580	0.979
ICC3,1	Delivery	0.958	0.805	0.997

Note. 8 subjects and 2 raters/measurements. ICC type as referenced by Shrout and Fleiss (1979).

Participants' CI accuracy and delivery results of speech 2 can be found in Tables 4.13. which shows the results of all participants' accuracy and delivery scores rated by Rater T and Rater B. Descriptive statistics in Table 4.14 depicts the mean, SD, minimum and maximum scores in the category of accuracy and delivery given by two raters for the control group, and Table 4.15 shows the results of the experimental group.

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Table 4.13

CI results – Second Speech

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
C1	43	45	48	49
C2	42	46	51	52
C3	29	32	35	39
C4	48	46	48	48
E1	40	42	48	39
E2	47	45	45	47
E3	42	44	50	50
E4	43	41	46	40

Note. C = Control E = Experimental

Table 4.14

Descriptive Statistics of Speech 2 rating results – Control Group

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
Mean	40.5	42.25	45.75	46.75
Std. Deviation	8.103	6.85	7.274	5.5
Minimum	29	32	35	39
Maximum	48	46	51	52

Table 4.15

Descriptive Statistics of Speech 2 rating results – Experimental Group

	Accuracy		Delivery	
	Rater T	Rater B	Rater T	Rater B
Mean	43	43	45.75	44
Std. Deviation	2.944	1.826	2.217	5.354
Minimum	40	41	45	39
Maximum	47	45	50	50

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The ICC coefficients of accuracy and delivery of speech 2 were calculated by JASP. As Table 4.16 shows, the ICC coefficient of accuracy is 0.889, which is considered to be "excellent" by the guideline provided by Koo and Li (2016). The ICC coefficient of delivery is moderately reliable. The biggest discrepancy in Rater T and Rater B's assessment was with participant E1's delivery performance. As mentioned before, both speeches were broken into 11 segments, and each rating unit was given a score. The scores given by Rater T for participant E1's deliver was either 5 or 4, while Rater B gave a more conservative assessment with scores ranging from 3 to 5, and mostly 3. This likely contributed to a lower inter-rater reliability in delivery.

Table 4.16

Speech 2 Intraclass Correlation

Type	Category	Point Estimate	Lower 95% C	Upper 95% CI
ICC3,1	Accuracy	0.889	0.547	0.977
ICC3,1	Delivery	0.668	0.003	0.927

Note. 8 subjects and 2 raters/measurements. ICC type as referenced by Shrout and Fleiss (1979).

Tables 4.18 and 4.19 display the result of participants' final score of speech 1 and speech 2. To calculate the overall score of each participant's accuracy and delivery of speech 1 and speech 2, accuracy and delivery scores given by Rater T and Rater B were first averaged. Next, the average (accuracy 50% and delivery 50%) was calculated. The "Final" column in Tables 4.17 lists the final result, mean and SD of participants' scores from speech 1 and Table 4.18 lists the final result, mean and SD of participants' scores from speech 2.

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Table 4.17

CI Final Results – First Speech

ID	Accuracy	Delivery	Final
C1	42	46	44
C2	44	51.5	47.75
C3	29	34	31.5
C4	47	47.5	46
Mean (SD)			42.31 (7.37)
E1	37	39	38
E2	40.5	45.5	43
E3	48.5	51	49.75
E4	36.5	45.5	41
Mean (SD)			42.94 (4.99)

Note. C = Control E = Experimental

Table 4.18

CI Final results – Second Speech

ID	Accuracy	Delivery	Final
C1	44	48.5	46.25
C2	44	51.5	49.25
C3	30.5	37	33.75
C4	47	48	47.5
Mean (SD)			44.19 (7.07)
E1	41	43.5	42.25
E2	46	46	45.25
E3	43	50	46.5
E4	42	43	42.5
Mean (SD)			44.13 (2.09)

Note. C = Control E = Experimental

As can be seen in the two Tables 4.18 and 4.19, for Speech 1, the control group's mean score was 42.31, while the experimental group's mean score was 42.94. For Speech 2,

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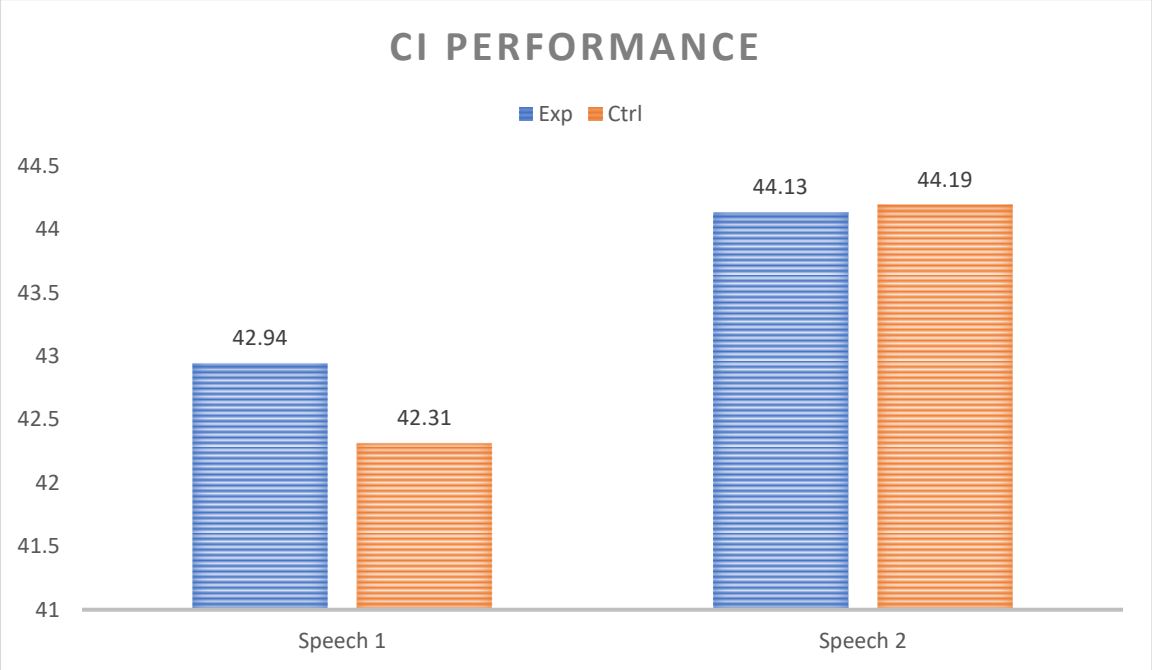
the control group's means score was 44.19 and the experimental group was 44.13. These numbers are depicted in Figure 4.4. Both the experimental and the control group performed better after the induction/rest. The increase in the scores of the experimental group after the induction was not significant (z = -0.7, p = 0.6). The difference between the control group's first and second CI performance is not significant (z = -1.8, p = 0.1). The difference between the experimental group and the control group during the second test is also not significant (p = 0.5).

Figure 4.4

CI Performance



During the retrospective interview, participant C1 disclosed that they used an Apple Watch app called Mindfulness[3] to practice a one-minute breathing exercise half way through the rest time. Control group participants were free to do what they wanted during rest time

[3] Apple Inc. *Mindfulness* (2021). Apple Inc. [Apple Watch app]. App Store https://apps.apple.com/us/app/mindfulness/id1560383515

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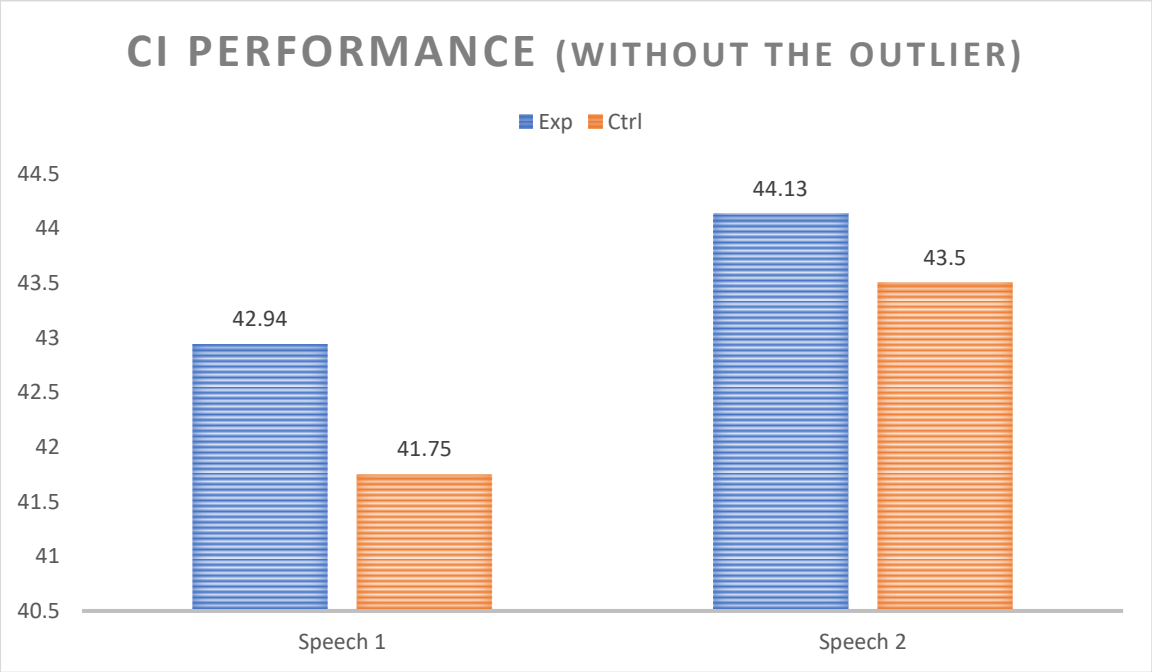
and were blind to the study aim. C1 was the only participant in the control group who practiced mindfulness breathing on her own volition, and her Y-1 and NASA-TLX scores showed a different pattern from that of the other three participants. Findings from individual results are discussed in the following section 4.2. When the outlier's second CI performance was excluded from the control group, the control group's mean score of the second speech went down, from 44.19 to 43.5, and the difference with the experimental group grew, from 0.13 higher than the experimental group, to 0.63 lower than the experimental group (Figure 4.5). The Group difference of the second speech with or without the outlier was insignificant (with the outlier: $u = 11$, $p = 0.5$; without the outlier: $u = 8$, $p = 0.6$).

Figure 4.5

CI Performance Without the Outlier



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4.2 Findings from Individual Results

This section depicts findings from individual results during the experiment, including individual results from the experimental group and the control group.

4.2.1 Individual Results from the Experimental Group

Figure 4.6 displays the state anxiety scores of each participant before and after the induction. Scores from E2, E3, and E4 appeared to converge to a lower point after the induction, while the state anxiety score of E1 increased by 1 point after the induction. Participants' workload scores after the induction can be found in Figure 4.7.

Figure 4.6

Individual Results of Experimental Group Participants' Y-1 Score

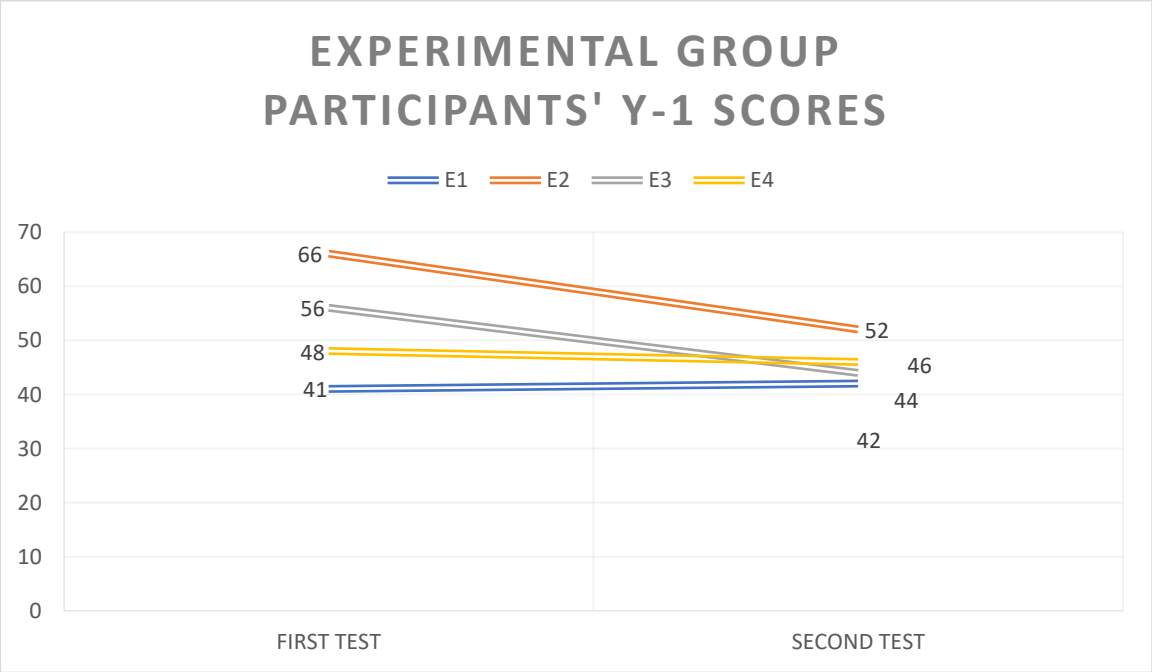

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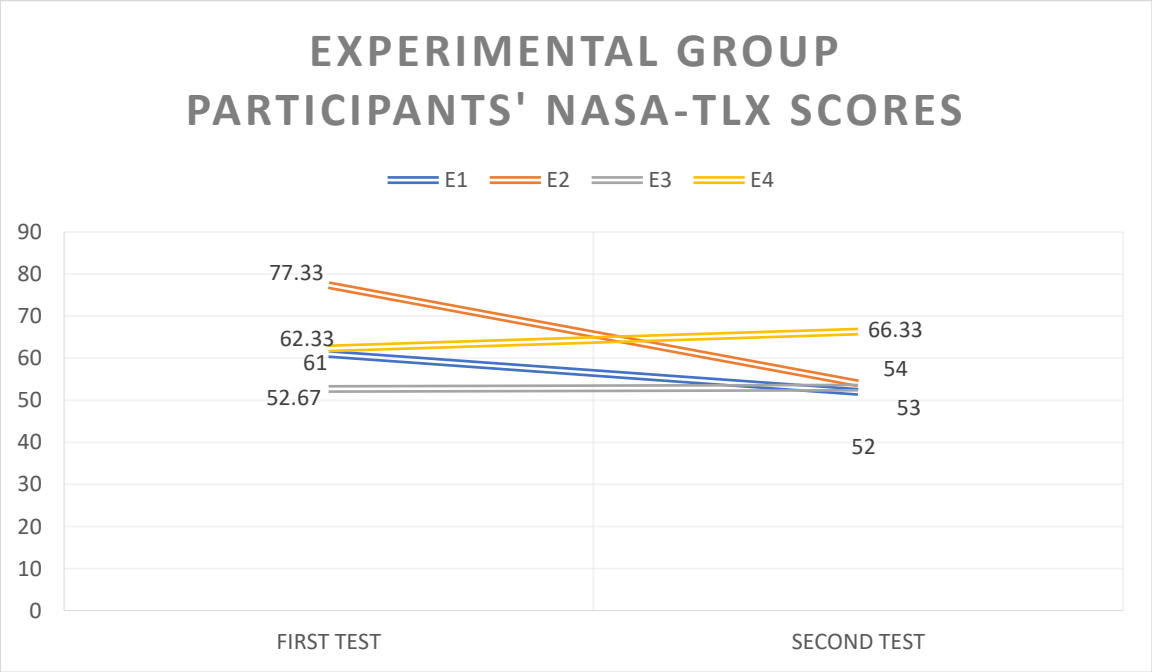
Figure 4.7

Individual Results of Experimental Group Participants' NASA-TLX Scores



E2 (indicated by the red line) was the only participant in the experimental group who had no prior experience in any form of meditation. Both her Y-1 and NASA-TLX scores decreased more than other participants in the experimental group, but the increase in the CI performance of E2 was similar to other participants (Figure 4.8). In the retrospective interview, E2 said that practicing mindfulness breathing between the two interpreting tasks helped reduce stress and anxiety.

> E2: I felt less nervous and my hands didn't shake like during the first test. But I became too relaxed … a little bit of anxiety is needed for interpretation, and you have to push yourself in a turbo mode. I think I fell out of the turbo mode a little bit because of the induction.

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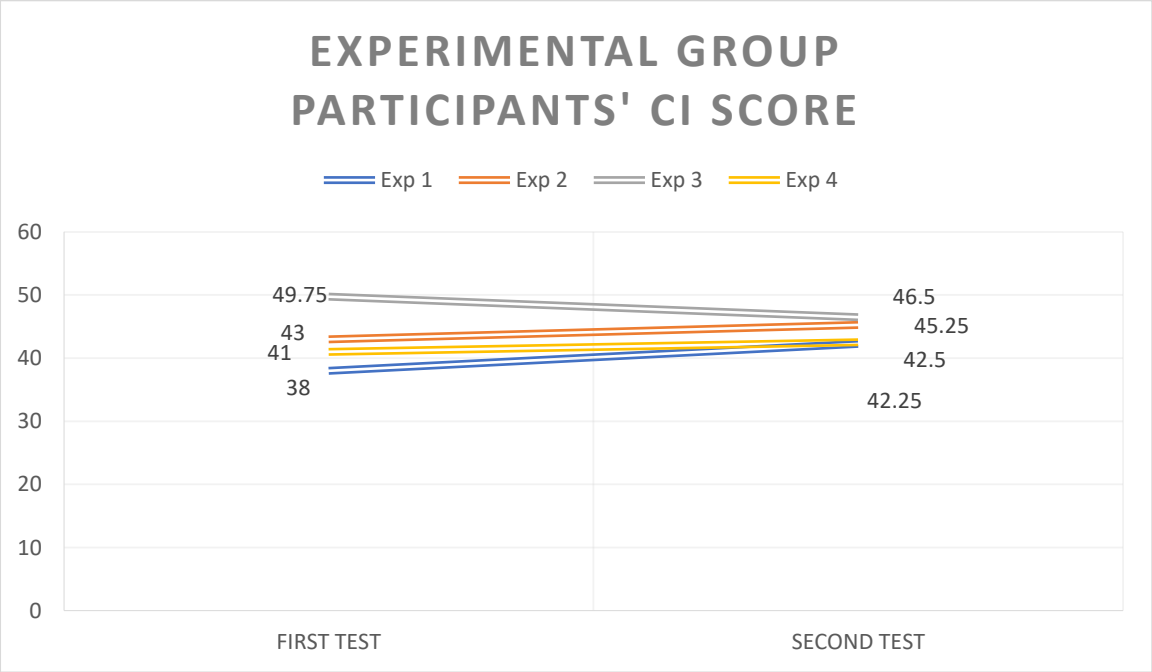
Figure 4.8

Individual Results of Experimental Group Participants' CI Scores



E2 referred to a "turbo mode" as a state of being alert and anxious before an interpreting task, but has not mastered this technique, as she was often "too relaxed or too anxious." Her answer to how much the induction affects the second CI performance was 5 (on a scale of 1 to 7, 1 = not at all, 7 = very much so), the highest of the experimental group. Her state anxiety scores from pre- and post-induction were both higher than her trait anxiety score, suggesting that she was more anxious than usual during the interpreting task.

E4 and E3 were the two participants whose workload increased after the induction (Figure 4.8). The increase of E4 was 4 points while the increase of E3 was 0.33, much smaller than E4. During the retrospective interview, E4 reported "feeling impatient" towards the guidance and preferred to have instructions throughout all 12 minutes without any silent parts, because she "felt lost and did not know what to do during the silent parts." E4 had tried

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mindfulness practice before, primarily with the Headspace app[4], when she became aware that she was prone to anxiety during the last year of college. Her trait anxiety score was 57, the second highest out of all participants in the current experiment. The Headspace app provides sessions of guided meditation in the form of videos with simple animations through a paid subscription service. For a review of the app, see Lee (2023). Users are guided every step of the way throughout the video. In most of the free practice videos, the longest time span left for users to be in touch with how they feel are never more than a few seconds. This setup is different from the induction material used in the current study which sets aside two long segments (1 minute and 1.5 minute) for users to practice on their own. E4 was not a paid subscriber of the Headspace app and presumably most of the videos she practiced with did not have silent segments as long as the induction material in the current study. This could be why she was not receptive of the induction in the current experiment.

E1 expressed a dismissive attitude towards the induction guidance and considered it having no impact on the second CI performance whatsoever. The prior meditation experience of E1 was short sitting meditations before Aikido practice from high school to university. During the induction of the current experiment, the researched observed that E1 fidgeted for the first 2/3 of the practice. At around the 1-minute mark of the induction, the instruction invited the listener to sit upright in a dignified position. This behavior was observed in the other participants from the experimental group but not in E1, signaling that E1 was not following instructions. In the retrospective interview, E1 said that "mindfulness breathing can probably help [reach a state of concentration] but I don't think this recording is very effective… The instruction gave too many options and caused confusion." Only in the last three minutes of the induction, E1 appeared to gradually settle down to the meditation

[4] Headspace Inc. (2022). *Headspace* (Version 3.269.0) [Mobile app]. Apple App store. https://apps.apple.com/us/app/headspace-mindful-meditation/id493145008.

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practice. The state anxiety score of E1 remained constant pre- and post-induction (Y-1-1 = 41, Y-1-2 = 42), but his perceived workload decreased 9 points, from 61 to 52. This suggests that although E1 was dismissive of the induction material and was not following the instruction most of the time, the final minutes of practice had some impact on lowering the participant's perceived workload. E3 has done breathing exercise in the past when practicing yoga. After the induction, her state anxiety score decreased 12 points, from 56 to 44, close to her trait anxiety score (46), and her workload scores before and after induction were about the same (52.67, 53). E3 rated the impact of the induction on the second CI performance as 2 (1 = no impact) and regarded "interpreting skill and personal habit" as playing a bigger role on the outcome of performance. But E3 also mentioned that breathing exercise would have had a bigger impact if she had been extremely nervous.

4.2.2 Individual Results from the Control Group

Individual results of control group participants' state anxiety (Y-1) score and workload (NASA-TLX) are depicted in Figures 4.9 and 4.10. On both figures, a unison of upward trend among C2, C3 and C4 (indicated by the red, grey and yellow lines) can be observed.

doi:10.6342/NTU202304434

Figure 4.9

Individual Results of Control Group Participants' Y-1 Score

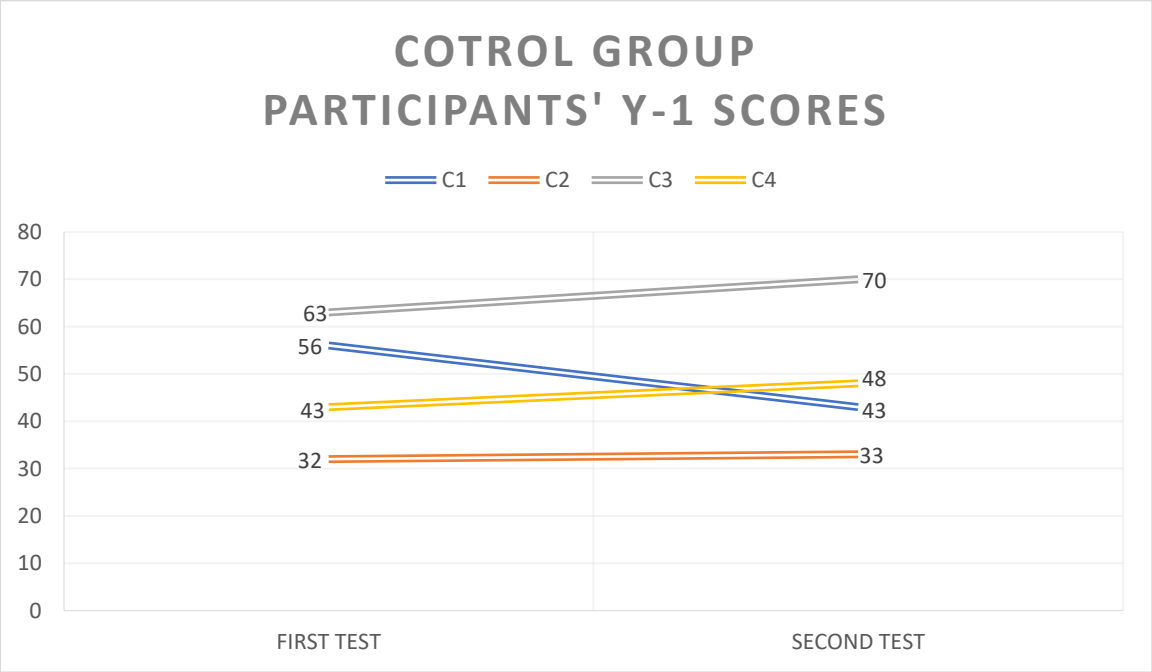
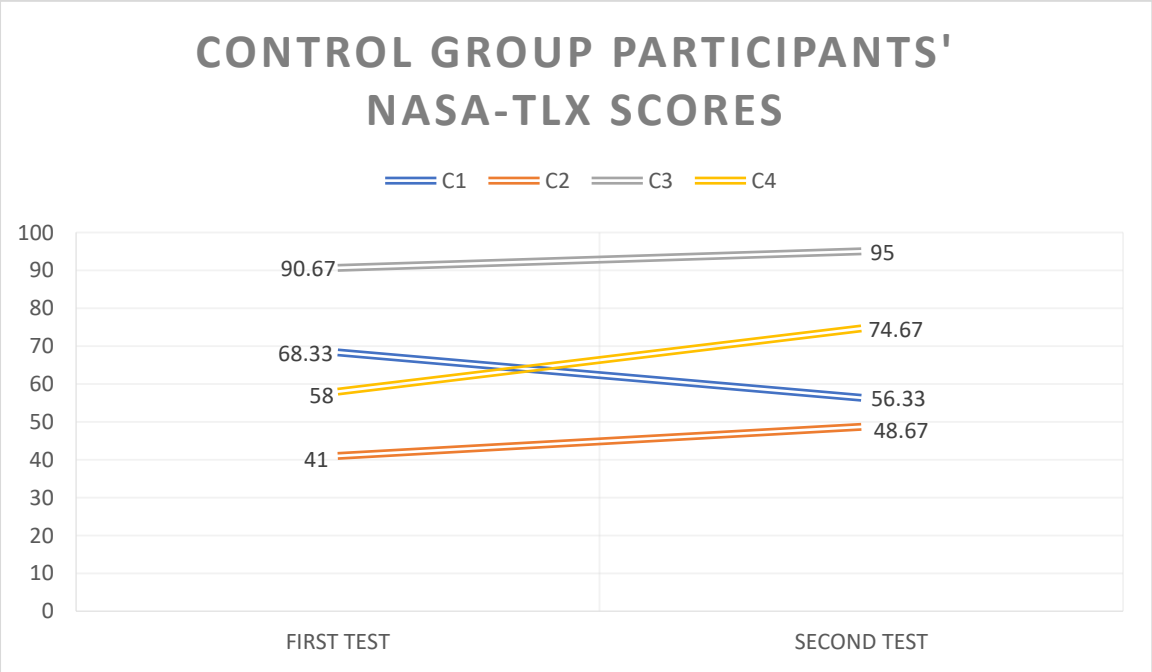


Figure 4.10

Individual Results of Control Group Participants' NASA-TLX Scores



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C1 (indicated by the blue line), the participant that used the Apple Watch app Mindfulness to practice a one-minute breathing exercise during rest time, was the only participant in the group whose post-rest state anxiety and workload scores both decreased. C1 had the lowest trait anxiety score (29) out of all participants, but her first state anxiety score was the third highest, suggesting that she was one of the more anxious participants after the first interpreting task. Her ratings of speech difficulty (6 for Speech 1, 5 for Speech 2, where 7 means extremely difficult) were also the highest among all participants. However, the high ratings were not due to unfamiliarity with the topics, as she rated topic familiarity 2 for speech 1 and 3 for speech 2 (7 = extremely unfamiliar). These ratings suggest that although C1 was familiar with the topics, interpreting task posed a considerable amount of stress nonetheless.

After rest time, the state anxiety score of C1 decreased by 13 points. Her workload score after rest was 12 points lower than the first measure. These results showed that even though C1 only practiced mindfulness breathing for one minute, its effect on lowering anxiety level and perceived workload was similar to that of the 12-minute induction that the experimental group undertook. What was worthy of note was that the breathing exercise was not something that C1 routinely practiced. She said, "During rest time I was really bored, so I thought, why not try breathing with the app… perhaps it would help."

If we consider CI an outlier and excluded her data, the control group's pre-test mean score of state anxiety went down to 46, and its post-test group mean went up to 50.33 (see Table 4.19 and Figure 4.11). There were no significant differences found between the control and the experimental groups without the outlier either in the pre-test ($u = 4$, $p = 0.6$) or post-test ($u = 7$, $p = 0.9$). No differences were found among the participants in the control group without the outlier either ($u = 0$, $p = 0.3$). However, these results showed that when the data of C1 were excluded, the control group's mean score of state anxiety increased after rest.

doi:10.6342/NTU202304434

Table 4.19

Descriptive Statistics of Y-1 Without the Outlier

	Y-1-1		Y-1-2	
	Control	Experimental	Control	Experimental
Mean	46	52.75	50.33	46
Std. Deviation	15.716	10.751	18.61	4.32
Minimum	32	41	33	42
Maximum	63	66	70	52

Figure 4.11

Group Means of Y-1 Without the Outlier

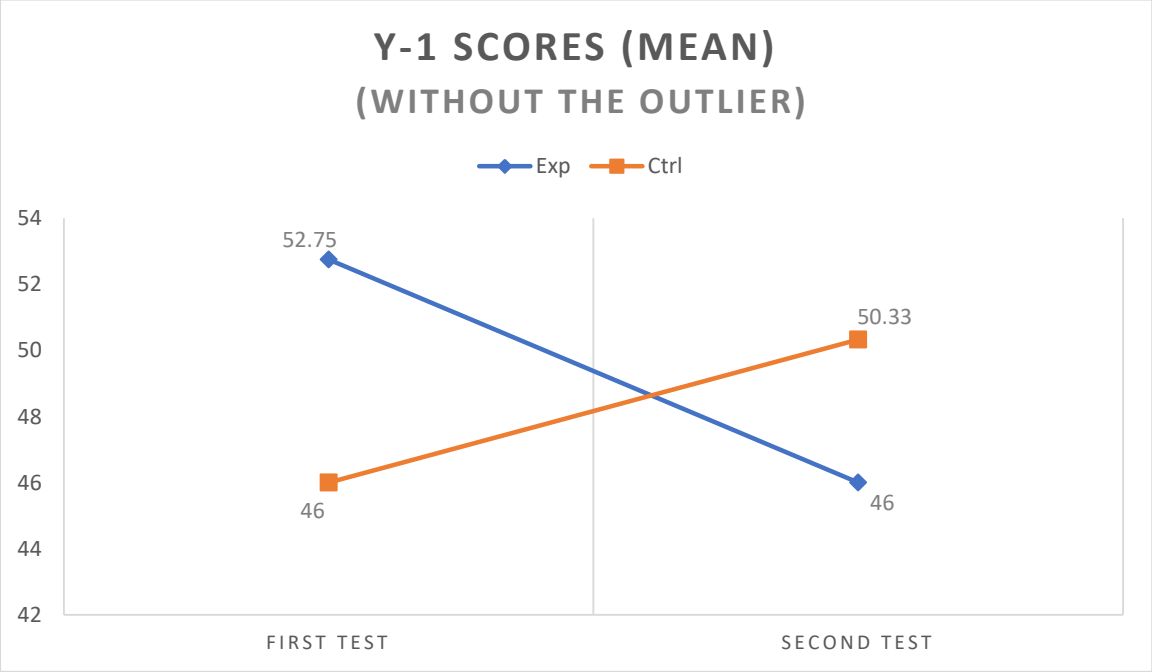

Table 4.20 shows the descriptive statistics of the two measures of NASA-TLX without the outlier. Figure 4.12 compared the group means of the control group without the outlier and the experimental group. The difference between the experimental and the control group was not significant (u = 8, p = 0.63), but a trend in which the perceived workload of the experimental group decreased after the induction can be observed, while the perceived

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workload of the control group increased after rest. Another observation was the perceived workload after the first interpreting task of both groups were very close whether the outlier's data were included or not (experimental: 63.33 vs. control: with the outlier 64.5 / without the outlier 63.22).

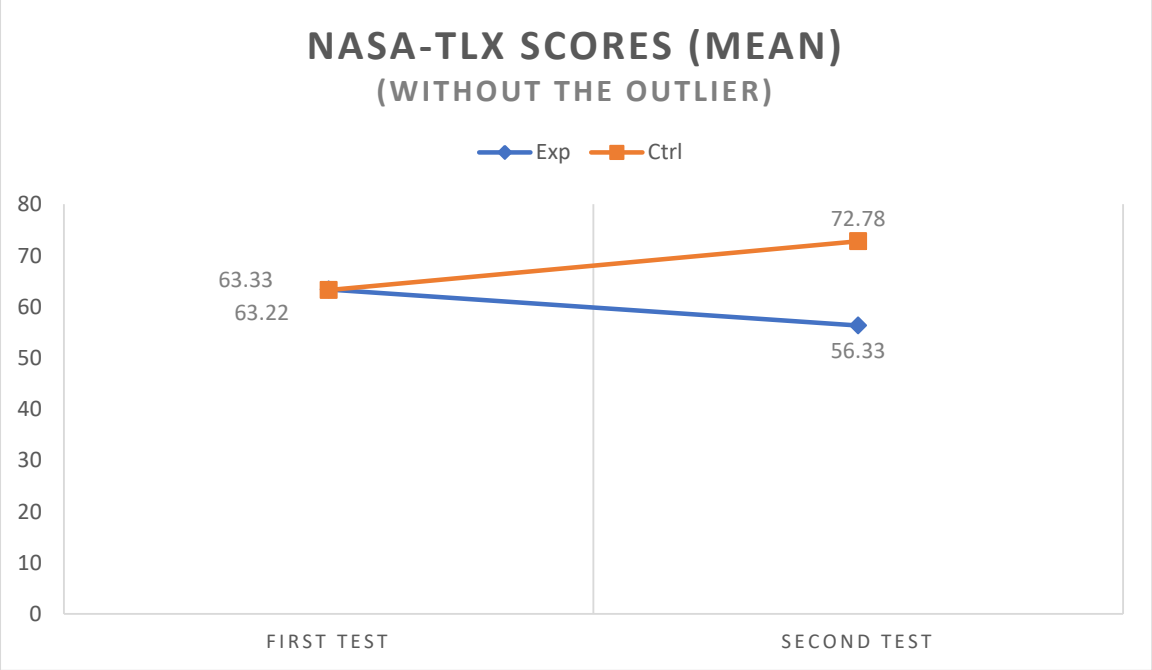
Table 4.20

Descriptive Statistics of NASA-TLX Without the Outlier

	NASA1		NASA2	
	Control	Experimental	Control	Experimental
Mean	63.22	63.33	72.78	56.33
Std. Deviation	25.244	10.264	23.223	6.715
Minimum	41	52.67	48.67	52
Maximum	90.67	77.33	95	66.33

Figure 4.12

Group Means of NASA-TLX Without the Outlier



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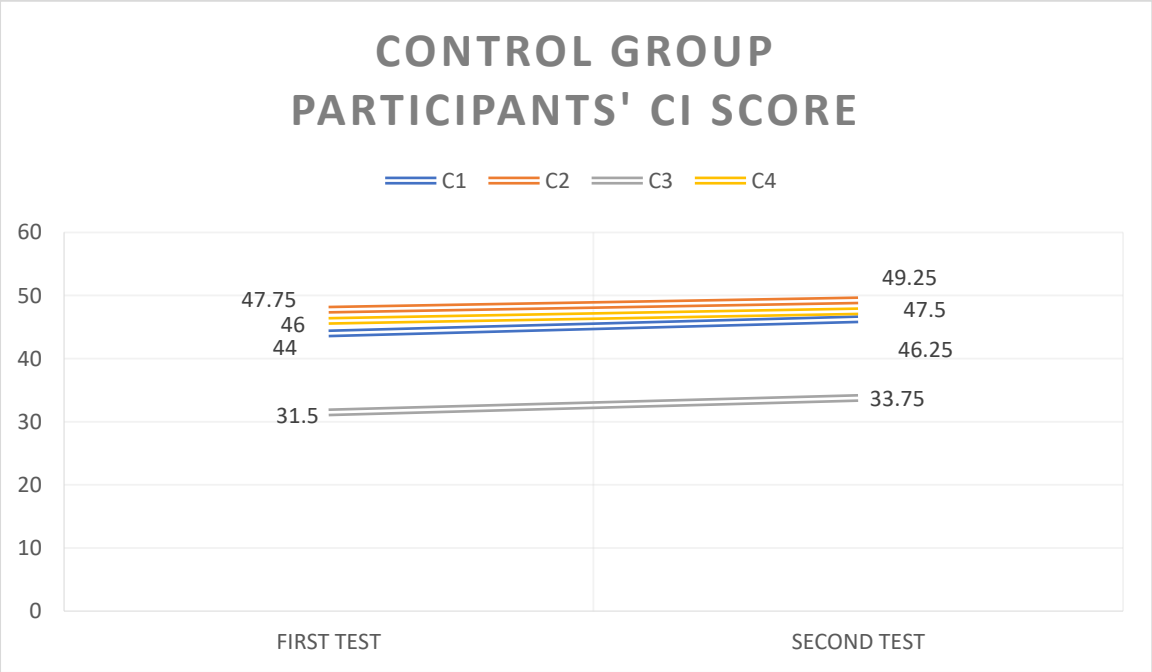
Although the decreases of state anxiety level and perceived workload of C1 were similar to participants from the experimental group, her improvement in CI performance was in accordance with other control group participants (Figure 4.13.)

Figure 4.13

Individual Results of Control Group Participants' CI Scores



C2 (indicated by the red line), who had the highest CI score, was also the least anxious participant in the study (trait anxiety: 34, state anxiety: 32 and 33). During the 12-minute rest time, C2 mostly looked at his mobile phone ("checking the stock market and Instagram"). He rated the difficulty of the first speech 2 and the second speech 3 (1 = extremely easy) and felt that "not taking time to rest would have been better if the topics of the speeches were similar." C2 rated the impact of rest time on the second interpreting task a 3. C2 believed that rest time did not have much impact (3 out of 7) on the second interpreting task, while C3 believed it was significant (7 out of 7). This was because C3 predicted the second speech would also be related to COP 27 and took the time to familiarize herself with

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issues from the conference. However, the state anxiety level and the perceived workload of C3 after the second test still increased, suggesting that preparation was not conducive to anxiety mitigation.

C4 was the only person in the control group who decided to really rest during rest time, putting arms on the table and resting their head on the arms. C4 rated the impact of rest time on the second interpretation task 5, but in a negative way, because they had to "reboot" for the second interpreting task, and "was not fully awake or in the zone during the first interpreting segment." Although rested, C4 reported the highest increase of workload (16.67) after the second interpreting task (see Figure 4.10), suggesting that workload demand still accumulated after rest.

4.3 Artificial Grouping: High Trait Anxiety Participants vs. Low Trait Anxiety Participants

The following sections described findings from the data when participants were regrouped according to their trait anxiety score. CI performance. state anxiety and perceived workload of the high trait group and the low trait group were analyzed.

4.3.1 CI Performance

In Chapter 3, I described the methodology used for the current study and how participants were grouped. Section 3.1 explained that participants' trait anxiety scores were collected and used as a benchmark to divide the participants into two groups of equal means. Although the current study intended to explore how state anxiety impacts CI performance, the researcher was also curious to see how participants performed if they were grouped by trait anxiety. Table 4.21 presents participants in two groups sorted by trait anxiety scores, as well as their CI scores from the first and the second test. The mean and SD of the low trait

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anxiety group were 34.5 and 4.9, and the high trait anxiety group were 55.25 and 7.46. A Mann-Whitney U test was conducted and found that this difference is significant (u = 16, p = 0.03). Both the low trait anxiety group and the high trait anxiety group included two participants from the control group and two from the experimental group, so the distribution was comparable.

Table 4.21

High and Low Trait Anxiety Participants' CI Scores

ID	Y-2	CI 1	CI 2
Low Trait Anxiety			
C1	29	44	46.25
C2	34	47.75	49.25
E1	34	38	42.25
E2	41	43	45.25
M (SD)	34.5 (4.9)	43.19 (4.02)	45.75 (2.89)
High Trait Anxiety			
E3	46	49.75	46.5
C3	54	31.5	33.75
E4	57	41	42.5
C4	64	46	47.5
M (SD)	55.25 (7.46)	42.06 (7.9)	42.56 (6.26)

Note. C = Control E = Experimental

Figure 4.14 shows that while the interpreting performance of both groups improved during the second test, the low trait anxiety group performed better than the high trait anxiety group in both tests, and the improvement of the low trait anxiety group was much higher than the high trait anxiety group. The low trait anxiety group's performance gain was not significant (z = -1.8, p = 0.1), and the high trait anxiety group's improvement in the second test was not significant either (z = -0.3, p = 0.9).

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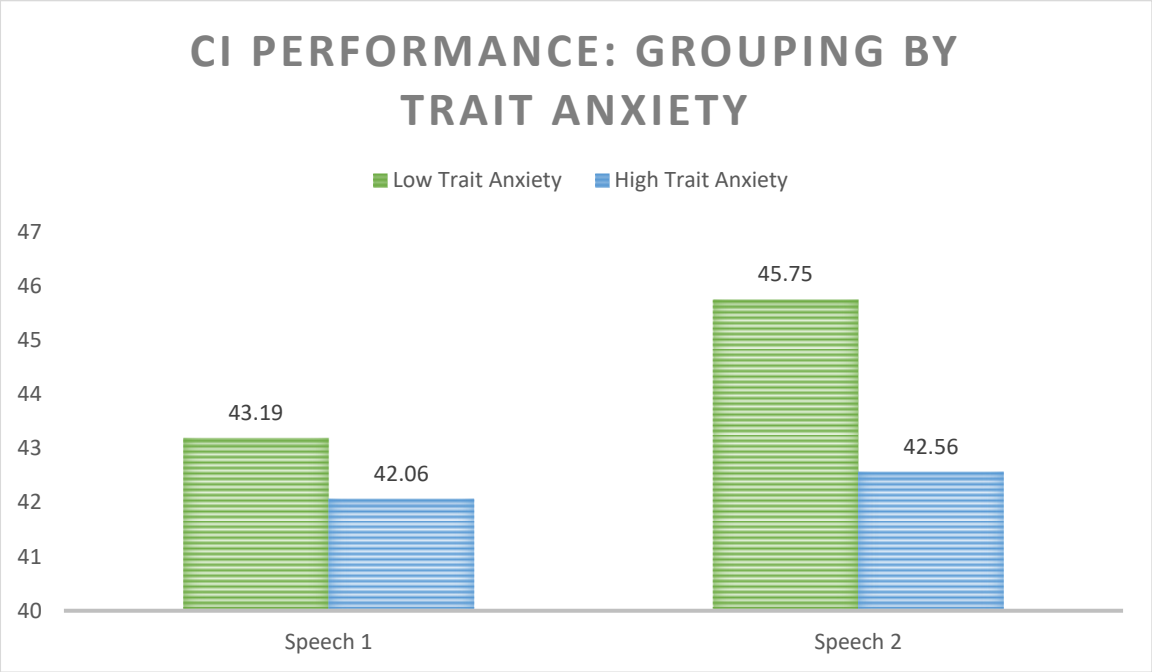
Figure 4.14

Group Means of CI Performance of High and Low Trait Anxiety Groups



4.3.2 State Anxiety of High and Low Trait Anxiety Participants

This section looks at the state anxiety scores of the high and low trait anxiety groups. The mean and SD of both groups' state anxiety scores after the two interpreting tasks were shown in Table 4.22.

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Table 4.22

High and Low Trait Anxiety Participants' State Anxiety Scores

ID	Y-2	Y-1-1	Y-1-2
Low Trait Anxiety			
C1	29	56	43
C2	34	32	33
E1	34	41	42
E2	41	66	52
M (SD)	34.5 (8)	48.75 (15.17)	42.5 (7.77)
High Trait Anxiety			
E3	46	56	44
C3	54	63	70
E4	57	48	46
C4	64	52	48
M (SD)	55.25 (7.46)	52.5 (8.81)	52 (12.11)

Note. C = Control E = Experimental

As Figure 4.15 demonstrated, the data here showed that the low trait anxiety group's average state anxiety scores from both tests were consistently lower than those of the high trait anxiety group. The decrease of state anxiety scores for the low trait anxiety group was not significant ($u = 0.73$, $p = 0.58$).

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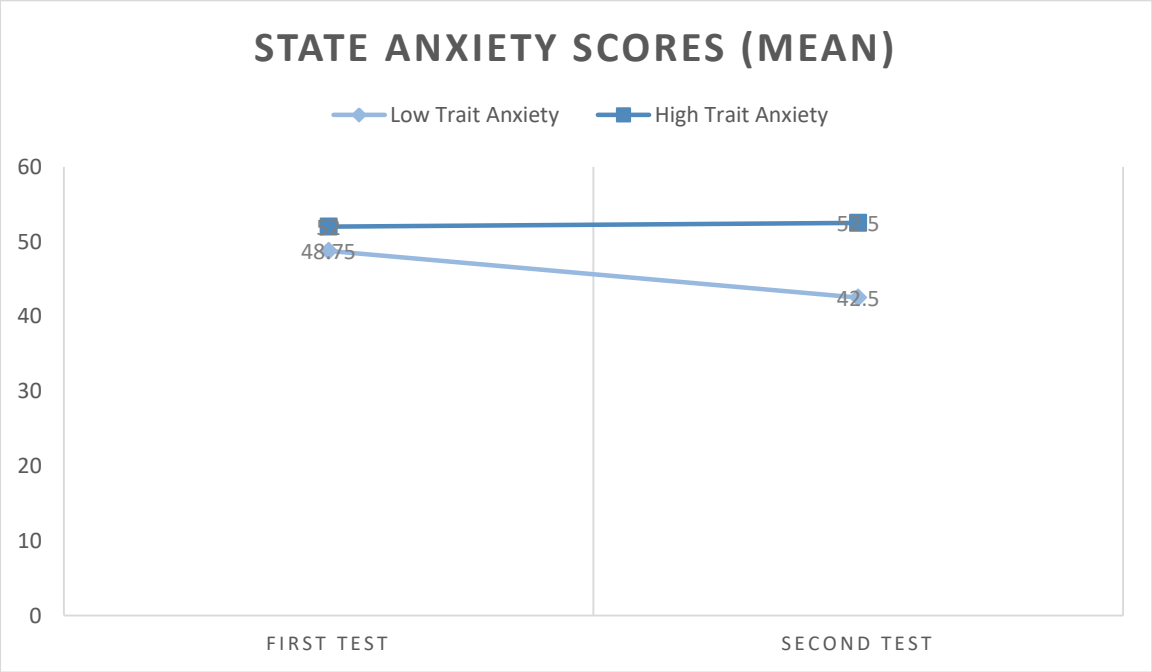
Figure 4.15

Group Means of State Anxiety of High and Low Trait Anxiety Groups



4.3.3 Workload of High and Low Trait Anxiety Participants

The perceived workload of the first speech of the low trait anxiety group and the high trait anxiety group were 61.92 and 65.92 respectively (Table 4.23). For the second speech, the perceived workload of the high trait anxiety group increased to 72.25 while the low trait anxiety group decreased to 52.75.

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Table 4.23

High and Low Trait Anxiety Participants' Workload Scores

ID	Y-2	NASA-1	NASA-2
Low Trait Anxiety			
C1	29	68.33	56.33
C2	34	41	48.67
E1	34	61	52
E2	41	77.33	52
M (SD)	34.5 (8)	61.92 (15.46)	52.75 (3.25)
High Trait Anxiety			
E3	46	52.67	53
C3	54	90.67	95
E4	57	62.33	66.33
C4	64	58	74.67
M (SD)	55.25 (7.46)	65.92 (16.97)	72.25 (17.6)

Note. C = Control E = Experimental

Figure 4.16 showed the pattern of how perceived workload changed in the second test for the high and low trait anxiety groups. This pattern is similar to group results of the original experimental design, which is the perceived workload after the first interpreting task of both groups were very close. The increase of perceived workload was insignificant for both the high trait anxiety group (z = -1.8, p = 0.1) and the low trait anxiety group' (z = 1.5, p = 0.3).

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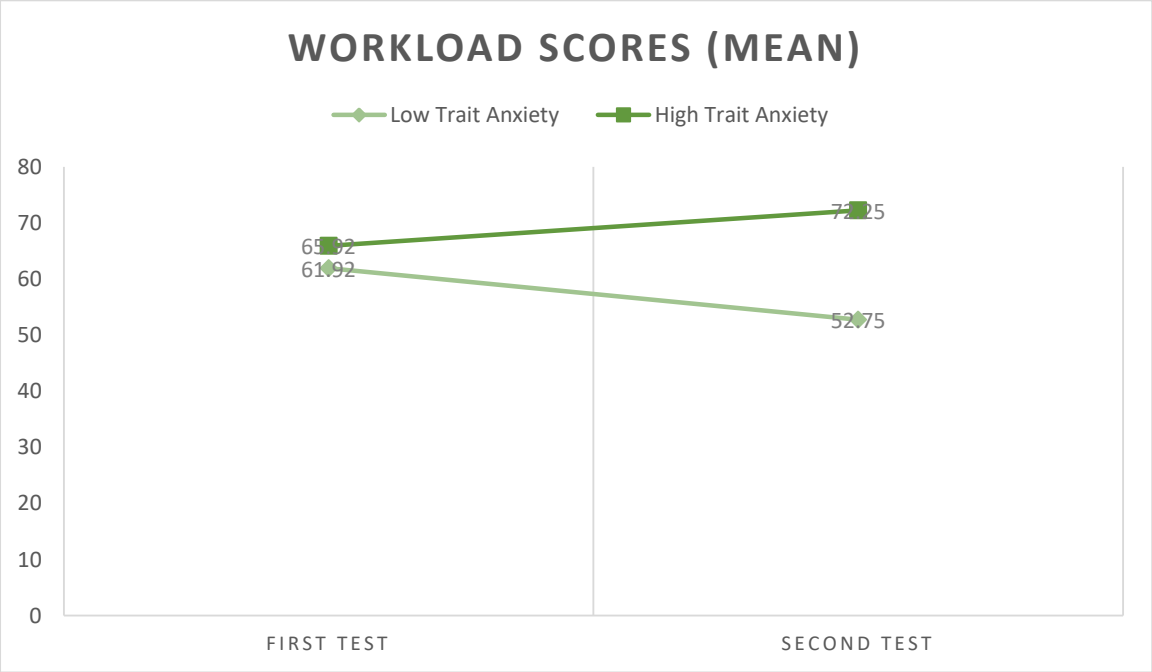
Figure 4.16

Group Means of Workload of High and Low Trait Anxiety Groups



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Chapter 5 Discussion

In this chapter, an analysis will be conducted on the quantitative data obtained from the experiments. This data will be triangulated with the qualitative data from the retrospective interviews to provide a comprehensive examination. The results of the study will be discussed with those of related previous studies in order to identify areas of convergence and divergence, and to provide a more comprehensive understanding of the research topic.

5.1 Summary of Findings

This study had found a brief mindfulness breathing exercise to have some effect on state anxiety and perceived workload. Section 5.1.1 will delve into the effectiveness of the brief mindfulness breathing exercise on state anxiety, while Section 5.1.2 will explore its influence on perceived workload. Table 5.1 presents all the mean scores of the control group and the experimental group in the current study, including their trait anxiety (Y-2), first and second CI, state anxiety (Y-1) and NASA-TLX, as well as the *u* value and *p* value from the Mann-Whitney U test.

Table 5.1

All Mean Scores and the Statistic Values of the Control Group and the Experimental Group

	Control Group (M)	Experimental Group (M)	*u*	*p*
Trait Anxiety (Y-2)	45.25	44.5	7.5	1
1st CI Score	42.31	42.94	9	0.9
1st State Anxiety (Y-1)	48.5	52.75	6.5	0.8
1st NASA-TLX	64.5	63.33	8	1
2nd CI Score	44.19	44.13	11	0.5
2nd State Anxiety (Y-1)	48.5	46	8	1
2nd NASA-TLX	68.67	56.33	11	0.5

Note. Mann-Whitney U test.

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5.1.1 The Efficacy of a Brief Mindfulness Breathing Exercise on State Anxiety

Results of group means of state anxiety presented in section 4.1.1 show that in the second test, the state anxiety level of the experimental group was somewhat lower than the control group, although the effect size is modest. Section 4.2.1 demonstrated that based on the raw scores of Y-1, a 12-minute mindfulness breathing exercise has a positive effect of reducing state anxiety for three of the four participants in the experimental group. In fact, the fifth participant of the experimental group whose data was ultimately excluded from the study due to experimenter error also reported a lower state anxiety after the intervention. This finding was in line with findings from previous studies (Edwards et al., 2018; Ernst & D'Mello, 2020; McClintock & Anderson, 2015) of the efficacy of a single session brief mindfulness intervention on lowering state anxiety. These studies adopted different lengths of mindfulness treatments, the shortest being a 3-minute mindfulness exercise in Ernst and D'Mello (2020), which is of particular significance for the current study. In section 4.2.2, the quantitative data of individual results from the control group showed that C1, who practiced a one-minute mindfulness breathing exercise, was the only participant whose state anxiety level was lower in the second test. If a 3-minute mindfulness exercise can significantly decrease participants' state anxiety level, the decrease of the state anxiety level (and workload) of C1 in the second test could be attributed to the one-minute mindfulness breathing exercise that C1 practiced during rest time.

5.1.2 The Efficacy of a Brief Mindfulness Breathing Exercise on Workload

Previous studies with longer intervention periods found that mindfulness breathing techniques could significantly reduce the mental demand, physical demand, temporal demand and the effort demand on the NASA-TLX scale (Rashidi et al., 2022). Another study employing micro-breaks of mindful breathing and shoulder rotations to impede fatigue

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development during computer work also found that perceived workload obtained from NASA-TLX was significantly lower in the intervention condition (Zargari Marandi et al., 2019). In the current study, findings from group results (see 4.1.2) and individual results (see 4.2.1 and 4.2.2) were in line with previous literature. Although the intervention of a mindfulness breathing exercise did not achieve a significant decrease in workload, all participants in the control group except for the outlier reported higher perceived workload in the second test. The fifth participant from the control group whose data was excluded from the study due to experimenter error also reported a higher workload in the second test. C4 was the only person in the control group who decided to really rest between the two interpreting tasks, and interestingly, C4 reported the highest increase of workload than any other participants from the same group, indicating that resting might not be able to keep workload from building up.

In analyzing how levels of perceived workload changed during the first and the second test, the current study made three comparisons: 1) the experimental group and the control group, 2) the experimental group and the control group without the outlier who practiced a one-minute mindfulness breathing exercise, and 3) the high trait anxiety group and the low trait anxiety group. The three comparisons all revealed a similar pattern. After the first test, the perceived workload of any group was about the same level. After the second test, the perceived workload of the control group and the high trait anxiety group went up, and the perceived workload of the experimental group and the low trait anxiety group went down. No matter how participants were grouped, the group means of the first test (63.33, 64.5, 63.22, 61.92, 65.92) were always close and very high. Grier (2015) analyzed over 1000 global NASA-TLX scores from over 200 publications, and presented the results of the range

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and quartiles of observations for different task types, including cognitive tasks[5] and memory tasks[6]. In the current study, the perceived workload of the first interpreting task for any group was at the Max level of the category of cognitive tasks (see Table 6 in Grier's paper), suggesting that consecutive interpretation consumed a large amount of cognitive load.

The 12-minute induction might be effective in preventing the perceived workload from building up, because the experimental group and the low trait anxiety group had a lower level of perceived workload in the second test, while the control group and the high trait anxiety group experienced more perceived workload in the second test.

5.2 Workload, State Anxiety and CI Performance

NASA-TLX was employed in the current study to gauge participants' perceived workload when they finished the interpreting tasks, and it was observed that mean score of perceived workload and CI performance were always negatively correlated, no matter how participants were grouped, which was different from the correlation of anxiety and CI performance. To further understand the relationship between workload and CI performance and the relationship between state anxiety and CI performance, the data from all 16 interpreting tasks performed by the eight participants of the current experiment were plotted in Figures 5.1 and 5.2. Figure 5.1 shows the relationship between perceived workload and CI performance, and Figure 5.2 shows the relationship between state anxiety and CI performance.

[5] Tasks requiring mental action, e.g., computer programming, flight planning, proof-reading, speech shadowing, etc...
[6] Recall/recollection of stimuli.

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Figure 5.1

The Relationship Between Workload and CI Performance

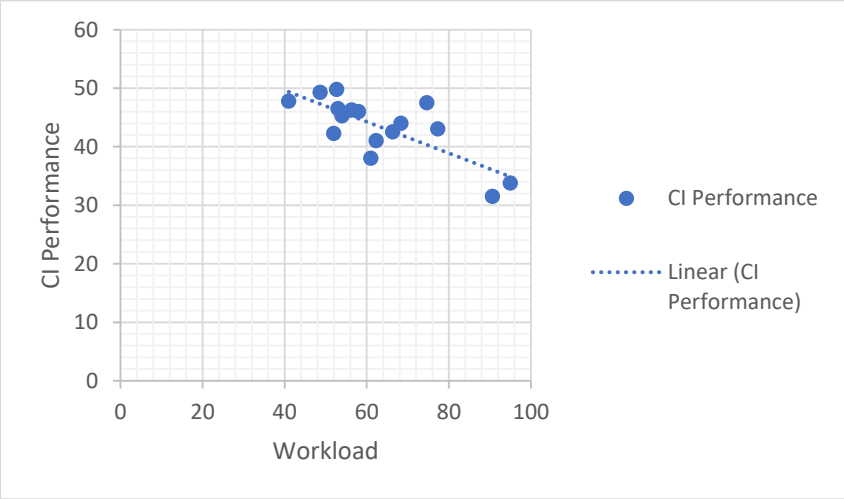
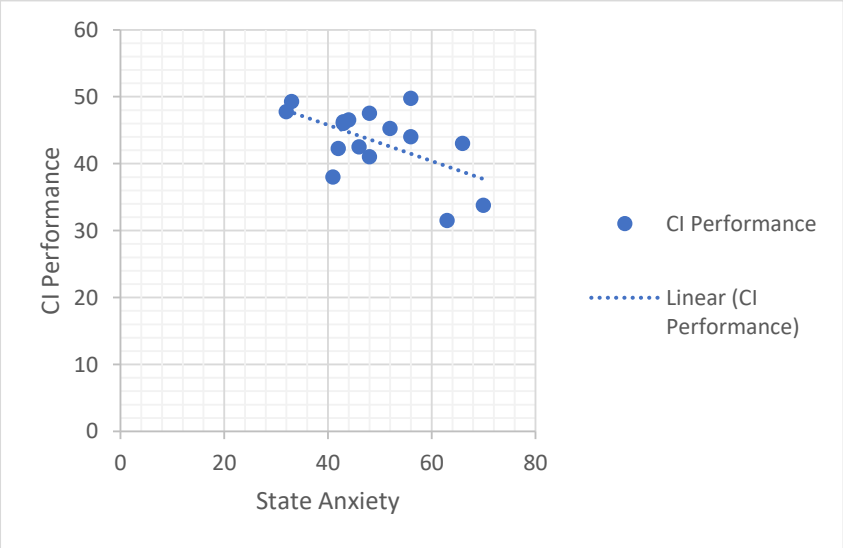


Figure 5.2

The Relationship Between State Anxiety and CI Performance



Both workload and state anxiety were negatively correlated with CI performance, but data distribution in Figure 5.1 appeared to converge more linearly. Spearman's correlation coefficient (ρ) was calculated to examine the associations between workload and CI performance and state anxiety and CI performance. Table 5.2 demonstrated that while state

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anxiety and CI performance and workload and CI performance were both negatively correlated, the effect size of workload and CI performance was larger than that of state anxiety and CI performance. Section 5.1.2 discussed the observation that the perceived workload during the first test was very high for any group, and it was even higher during the second test for the control group. Because cognitive resources were limited, depletion of cognitive load would always result in impaired performance. This helps explain the finding in the current study that the control group performed worse than the experimental group during the second test. Results from the current study suggested that the efficacy of mindfulness breathing exercise may bring down perceived workload. If cognitive load could be "reset," then an impaired performance would likely be avoided.

Table 5.2

Spearman's Correlations

		n	Spearman's rho	p
CI Performance	- State Anxiety	16	-0.366	0.164
CI Performance	- Workload	16	-0.644 **	0.009
State Anxiety	- Workload	16	0.749 ***	< .001

* p < .05, ** p < .01, *** p < .001

5.3 Trait Anxiety, State Anxiety and CI Performance

Research studies have extensively examined the connections among trait anxiety, state anxiety, and performance, consistently revealing that anxiety induced by the pressure to succeed can impact performance in either a positive or negative manner. In a study about the relationships among trait anxiety, state anxiety and the goal performance of penalty shoot-out by university soccer players, Horikawa and Yagi (2012) examined how the level of trait anxiety influences state anxiety and penalty shoot-out performance under pressure. Their

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findings indicated that individuals with elevated trait anxiety scores are prone to experiencing heightened state anxiety when placed in high-pressure situations, and this heightened state anxiety negatively impacts their ability to achieve desired goals.

In the current study, findings from the relationship between state anxiety and trait anxiety also suggested that state anxiety was mediated by trait anxiety. The group with higher trait anxiety had a higher level of state anxiety in the first and the second tests, meaning that the group with higher trait anxiety had higher levels of state anxiety than the group with lower trait anxiety throughout the experiment. This finding is in line with the findings from Eysenck et al. (2005), in which the authors found that the group with higher trait anxiety exhibited notably poorer performance on the Corsi task compared to the group with lower trait anxiety, specifically when the additional concurrent task necessitated the utilization of the central executive component within the working memory system. Subsequently, the imposition of dual tasks that both demanded engagement of the central executive component resulted in diminished performance on both tasks among individuals characterized by high levels of trait anxiety. The findings that individuals with high levels of anxiety exhibited compromised central executive functioning in comparison to individuals with low anxiety levels aligns with the earlier findings reported by MacLeod and Donnellan (1993) as well as Derakshan and Eysenck (2009). These studies were perhaps even more significant in terms of their implication in interpreting studies, as the main and secondary tasks were both verbal in nature. Consequently, one could posit that the impaired performance of high-anxious participants on the primary task can be attributed to diminished resources available for verbal processing, indicating that the findings reflect a specific mechanism of processing within that particular domain. This helps to explain the different levels of performance gain of the experimental group and the low trait anxiety group that was artificially grouped. The experimental group gained 1.19 points at the second test, while the low trait anxiety group

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gained 2.56 points. The induction did help mitigate state anxiety for the experimental group and their second CI performance was better than the control group. However, when compared with the improvement of the low trait anxiety group, the increase was smaller. In other words, data from the current study suggested that CI performance was compromised by trait anxiety more so than by state anxiety.

Since trait anxiety seems to impact CI performance more than state anxiety for the participants in the current study, the researcher artificially regrouped the participants according to their state anxiety level and then compared their CI scores and trait anxiety to see if this was always the case. Results showed that in general, the group with lower state anxiety also had a lower level of trait anxiety and performed better than the group with higher state anxiety. However, in the first test, the group with lower state anxiety had a higher trait anxiety, and still performed slightly better than the group with lower trait anxiety but had a much higher level of state anxiety (Table 5.3).

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Table 5.3

High and Low State Anxiety Participants' Workload and CI Scores in the First Test

ID	Y-2	Y-1-1	NASA-1	CI1
Low State Anxiety				
C2	34	32	41	47.75
E1	34	41	61	38
C4	64	43	58	46
E4	57	48	62.33	41
M (SD)	47.25 (15.56)	41 (6.68)	55.58 (9.89)	43.19 (4.49)
High State Anxiety				
C1	29	56	68.33	44
E3	46	56	52.67	49.75
C3	54	63	90.67	31.5
E2	41	66	77.33	43
M (SD)	42.5 (10.47)	60.25 (5.06)	72.25 (15.96)	42.06 (7.64)

Note. C = Control E = Experimental

Findings from Lin et al. (2008) could perhaps provide an explanation to this contradictory result. Their study hypothesized that participants in the meditation group would have less anxiety during a performance, which would lead to better musical performance experience and quality. However, the study found that performance quality and performance anxiety were positively correlated. Timarová and Salaets (2011) found that among students studying interpretation, those who demonstrated effective coping skills and achieved successful outcomes were those who performed adeptly even when facing moderate to high levels of reported anxiety. Likewise, in the current study, participants spoke of lacking a certain level of alertness ("falling out of turbo mode," "needing some time to restart") after coming back from the intermission between the two interpreting tasks. Research in MPA and musical performance adopted the Yerkes-Dodson law and constructed the U-shape model as

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an attempt to explain the optimal anxiety level as a performance booster (Rae & McCambridge, 2004). According to this model, low arousal leads to poor performance (maladaptive), moderate arousal is considered optimal and enhances performance (adaptive), while very high arousal again leads to poor performance due to excessive mental and physical activation (maladaptive) (Simoens et al., 2015).

Participant E3, whose mean performance score was the highest, spoke of the debilitating anxiety that could affect performance and how the mindfulness breathing practice could alleviate anxiety before an interpreting task, "because when you are not overly anxious, you are more likely to bring out your usual performance." Wong (2008) explored the role of cognitive distortions and irrationality in test anxiety and found that a negative view of self, such as self-deprecatory thinking and self-evaluative worry, was a significant predictor of debilitating anxiety. Specifically, one of the negative patterns of self-cognition, namely worry, has been identified as having a correlation with performance expectancy. Worrisome thoughts can result in a higher level of state anxiety and therefore impair performance.

5.4 General Discussion

This study has found some benefit in the overall efficacy of a brief mindfulness breathing exercise before a consecutive interpretation task. The 12-minute induction was shown that it might lower the state anxiety level of participants and decreased the perceived workload they felt, although its benefit in improving performance was unclear. One potential explanation could be that the participants involved in the study were trainees, potentially lacking performance consistency. It is crucial to consider individual differences in cognitive abilities and trainee expertise when evaluating the effectiveness of the mindfulness breathing exercise on mitigating anxiety and improving CI performance.

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The finding that a one-minute breathing exercise had the same effect as a 12-minute mindfulness breathing exercise from this study may suggest that the induction time can be shorter. Beginning meditators may find it challenging to maintain focus and sustain attention for a long period of time, as the cases in Participants E4 and E1 of the current study showed. In a study by Balban et al. (2023), daily structured breathwork was found to improve mood and reduce anxiety more than mindfulness meditation. Participant C1 practiced a one-minute mindfulness breathing following an Apple Watch app and the effect was the same as a 12-minute guided mindfulness breathing exercise, showing that a short breathwork can be a useful tool for interpreter trainees to ground themselves before an interpreting task or exam. However, further research is needed to establish a definitive recommendation regarding the optimal duration for the breathing exercise before a CI task. Considering the administration timing of the breathing exercise, the ideal timing may depend on factors such as the duration of the exercise and the residual impact or influence on participants' cognitive states. It is important to assess the feasibility and practicality of implementing the breathing exercise within the study design.

Lastly, because both trait anxiety and state anxiety can impact interpreter trainees' CI performance, it would be beneficial for interpreting programs to provide courses on stress and anxiety or even provide anxiety questionnaires for students to fill out. By incorporating this curriculum, instructors can help identify high anxious individuals and provide necessary assistance and guidance so that students can benefit the most from the interpreting program. The true value of including courses on stress and anxiety in the interpreting school curriculum is for the students to learn about their impact on performance in a systematic way and to help students identify a useful tool that can avoid "choking" during exams or interpreting tasks.

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Chapter 6 Conclusion

This chapter summarizes the major findings of the current study. It will discuss the contribution and constraints inherent to this study. Lastly, this chapter will offer recommendations for prospective research endeavors.

6.1 Research Questions

Given the significance of anxiety regulation in the context of interpretation, the primary objective of this research was to address the following inquiries:

1. To what extent does a mindfulness intervention help reduce self-reported state anxiety?
2. To what extent does a mindfulness intervention help bring down perceived workload?
3. To what extent does a mindfulness intervention help enhance CI performance?

Results in the experiment showed that the mindfulness breathing exercise helped most of the participants in the experimental group lower their state anxiety level and perceived workload in various degrees during the second test. In the control group, except for the outlier who practiced a one-minute mindfulness breathing exercise during rest, the state anxiety level and perceived workload both increased during the second test for the rest of the control group participants. This finding suggested that both a 12-minute mindfulness breathing exercise and a one-minute mindfulness breathing exercise could help alleviate state anxiety and bring down perceived workload during the second test. Findings from the retrospective interview showed that participant's receptiveness towards the induction played a key role in how effective the mindfulness breathing exercise could be.

Regarding the third research question, it was unclear whether a brief mindfulness intervention could boost the interpreter trainee's consecutive interpretation performance. Results from the current study showed that the experiment group did not improve their CI

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performance significantly when compared with the improvement of the control group. When participants were artificially grouped by their trait anxiety, the group with lower trait anxiety scored higher than the group with higher trait anxiety during the second interpreting task. Data from the current study suggested that trait anxiety had a bigger impact on CI performance compared to state anxiety.

6.2 Contributions, Implications and Applications

To the author's knowledge, the current study is the first empirical study to explore the efficacy of a brief mindfulness intervention to enhance interpretation performance or mitigate interpretation anxiety. The current study found that mindfulness breathing exercise practiced before an interpreting task was beneficial in lowering the state anxiety level for interpreting trainees and bringing down their perceived workload during the task. Engaging in a brief mindfulness meditation might offer a practical and convenient approach for both interpreter trainees and professional interpreters to effectively manage anxiety prior to interpretation exams or assignments. Upon suggestions from previous research, the experiment successfully collected data from NASA-TLX to evaluate perceived workload of consecutive interpretations and was able to establish that CI performance and workload were negatively correlated, more so than CI performance and state anxiety.

6.3 Limitations

Similar to many studies conducted in the field of interpreting studies, the sample size in this study is limited and the results may lack conclusiveness. Due to the small number of interpreting institutions in Taiwan, it was difficult to find enough participants that met the requirement of the study to reach statistical significance.

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Although mindfulness has shown convincing results in the treatment of depression and anxiety, as Shonin et al. (2015) highlighted, some of the studies have failed to control for a placebo effect. This limitation is also applicable to the present study. The experimental design did not incorporate measures to control for the placebo effect to show that the CI performance gain was actually from the induction and not from the placebo effect. Given the small sample size, it would have been challenging to include a placebo control group (for example, a sham mindfulness meditation group) along with the regular control group.

Another limitation is the language proficiency of the participants. All participants recruited in the current study received a grade of A- and above in their basic consecutive interpretation course (English to Chinese), two of them did not take the advanced consecutive course and one of them had not practiced consecutive interpretation for a while prior to the experiment. If more participants could be recruited, the participant pool could have been more homogeneous in terms of language proficiency and familiarity with interpretation skills.

6.4 Recommendations for Future Research

Individual differences in cognitive abilities and trainee expertise are crucial when evaluating the effectiveness of the mindfulness breathing exercise on mitigating anxiety and improving CI performance. Therefore, professional interpreters would be better candidate participants than interpreter trainees to study the true effect of mindfulness meditation and its effect on interpreting performance. to future suggestion

Including a placebo-controlled group in an experimental study is of paramount importance to ascertain the true efficacy of a mindfulness intervention. Doing so helps differentiate between the genuine effects of meditation and potential confounding influence of placebo response. Future research endeavors should also explore the effects of various intervention durations. It would be beneficial to include different intervention groups with

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varying timeframes, such as a 3-minute mindfulness breathing exercise, 5-minute mindfulness breathing exercise, and beyond, to assess the impact of these different durations on the outcome. This would allow for a more nuanced understanding of the optimal duration required to elicit the desired effects of mindfulness breathing exercise. Incorporating physiological measures would also be valuable for assessing the efficacy of mindfulness breathing. Examining markers such as heart rate variability, cortisol levels, and skin conductance provides objective insights. Combining physiological results with self-report measures and performance outcomes yields a comprehensive understanding of mindfulness breathing's effectiveness.

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Appendix A - Stimuli materials

Speech 1

Mr. President, Excellencies, Ladies and Gentlemen,
Let me express my appreciation to the Government and People of the Arab Republic of Egypt for hosting this important conference.

We, the world leaders gathering here in Sharm el Sheikh, see the urgency of our response to climate change, which affects the well-being of mankind.

The scope of climate change requires our joint efforts. The EU climate ambition has always been very high, and even today, we stand ready to go on.

The rules of the Paris Agreement, the achievements of previous conferences, like Katowice, Madrid, and Glasgow, must be translated into concrete actions.

The Czech Republic is fully committed to the EU joint climate goals – to reduce greenhouse gas emissions by at least 55 % by 2030 and to reach the climate neutrality by 2050.

Presiding over the EU Council, we are working on the finalization of the *Fit for 55* package. It is a key legislative framework for achieving our goals. And it is completely in line with the *Nationally Determined Contribution* stipulated by the Paris Agreement.

Another topic brought forward under the Czech EU Presidency is the disaster risk reduction and adaptation to enhance climate security in fragile contexts.

The Prague Appeal has summarized principles and lessons learned for adaptation and reduction of loss and damage caused by climate change.

We have also repeatedly contributed to the *United Nations Office for Disaster Risk Reduction* work on early warning and early action. The goal is simple: to prevent and minimize losses and damages caused by climate change.

The adaptation to climate change is also the cornerstone of the Czech climate policy. We are focusing on appropriate adaptation capacity while fostering our climate resilience.

My government plans to phase-out coal, focusing on renewable and nuclear energy and maximising energy efficiency and savings.

And we keep our promises: By 2020, the Czech Republic reduced greenhouse gas emission by 43 % compared to 1990, a number well beyond our commitment.

Coping with the climate change is not only about domestic measures. We also need to assist other countries and regions.

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Excellencies, Ladies and Gentlemen,
To implement efficient climate policy, we need to keep building strong partnerships on all levels and across all sectors.

We need to work together on finding realistic and fair solutions that will help us overcome global climate challenges by reducing emissions, adaptation, innovation, and joint strategies.

This is our common task. We all need to take it seriously in order to provide a better future for next generations.

Thank you for your attention.

Speech 2

Ladies and gentlemen,

It is an honour to be here today. I am certain that this venue gathers during the two COP weeks more knowledge and expertise than any other place on the planet.

Energy has always been central to winning the fight against climate change. The majority of the world's greenhouse gases are created by the production and consumption of energy, so without decarbonising our energy systems, net zero will remain out of reach.

Our strategy to tackle both the climate and energy crisis at the same time is called REPowerEU. It has three main pillars.

First, it requires a renewables revolution.

A renewables-based energy system is our way to net zero. And it's also our way to energy independence.

We are already making good progress. 2022 will be a great year for renewables in Europe: the EU's new renewable capacity is set to more than double, to 50 gigawatts.

But we need to move even faster. The Commission has already proposed to raise our 2030 renewables target from 32% to 45%. We are overhauling our permitting rules, to get projects off the ground faster

Second, we must use less energy overall.

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For this winter, the EU Member States have agreed to reduce their gas consumption by 15%. We have also agreed to use less electricity when it comes to peak hours.

As with renewables, we are planning to upgrade our mandatory target for energy efficiency, to make sure that cutting consumption will not be a short-term trend only.

Third, we are diversifying our energy supplies and suppliers.

The share of Russian pipeline gas in the EU used to be over 40%. It is now down to 9% and the flows could stop any moment.

As we are reaching out to reliable suppliers around the world, we want to have a relationship that goes beyond gas. We look to future cooperation, for example on renewable hydrogen or other clean technologies. As one example of this cooperation, the EU will sign tomorrow a Memorandum of Understanding with Egypt on renewable hydrogen.

With 27 billion USD spent in 2020, and again in 2021, the EU and its Member States are the biggest providers of public climate finance.

But we know that funding the energy transition is not just about public finances. We need to build the regulatory frameworks and the financial incentives and markets to incentivise green energy growth. With the right investments we can ensure our energy security, and the health of our planet and life on it. Thank you.

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Appendix B - Information sheets for participants

Speech 1

Original speaker: Prime Minister Petr Fiala
Date of delivery: November 8, 2022

Czech Republic Prime Minister Petr Fiala delivered the speech at the plenary session of the 27th Climate Change Conference COP27.

Terms:

英文	中文
Sharm el-Sheikh	沙姆沙伊赫
Katowice	卡托維茲
Fit for 55	直接用英文 *Fit for 55*
Nationally Determined Contribution	國家自訂預期貢獻
United Nations Office for Disaster Risk Reduction	聯合國減災辦公室

Speech 2

Original speaker: European Commissioner for Energy Kadri Simson
Date of delivery: November 15, 2022

European Commissioner for Energy Kadri Simson delivered the speech at the plenary session of the 27th Climate Change Conference COP27.

Terms:

英文	中文
REPowerEU	直接用英文 REPowerEU
UNFCCC	聯合國氣候變遷綱要公約

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Appendix C - Transcript of twelve-minute guided breathing exercise

[00:01 - 06:03]

首先恭喜大家，在繁忙的生活當中，能夠有這樣子的一段時間，來跟自己的內心相處。

請先找到一個比較安全，並且相對安靜、不受打擾的空間，坐著。

你可以坐在椅子上，也可以盤腿坐在墊子上，假設你現在有瑜珈墊，或者是榻榻米之類的一個地上，也是可以的。但不管你坐在哪一個位置上，盡量的把你的腰桿挺直，讓你的脊椎從下而上的延伸，讓自己很有尊嚴的坐著。感覺一下你的身體正以這樣子有尊嚴的姿勢坐在這裡。

眼睛可以閉，可以張，依照你自己的習慣而定。肩膀，先把它放鬆，然後請感覺一下你的臀部與墊子之間碰到的接觸感，把重心放在下盤。

接著邀請大家把注意力放到鼻孔前緣這裡，來留意一個事實，就是有氣息現在正在這邊不斷的進-出、進-出。呼吸其實是我們最好的朋友，我們這一輩子的時間，它都跟我們在一起，不管你是開心的，它在。你難過的時候，它也在。你吃飯的時候它在，你睡覺的時候它還是在，那現在此刻，你正在聽我引導的這一個時間，它依然存在。所以我們要做的就是去觀察它，去體驗它，跟我們的呼吸在一起。

我們的任務很簡單，就是去觀察這個時刻它的狀態。基本上我們的呼吸就是由呼，還有吸這兩個組合成的。不是往外呼，就是往裡吸，那偶爾它可能會在呼跟吸之間停頓一下，那也都是很正常的。因此我們要做的就是去觀察一下，它此時的狀態，到底正在往裡吸還是往外呼，還是中間的停頓。我們就只做這件事情就好。

你也不用去控制它，你就是觀察它，體驗它。好像你在河流的旁邊看著水流，你也不會改變水流的速度。一樣的，你好像是一個旁觀者又放鬆又警覺地來觀察自己的呼吸。

當氣息進來的時候，你清楚的知道，喔它現在正在進來。

當它出去的時候，你也清楚的知道，嗯它現在正在出去。

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當它暫時停頓的時候，你也知道喔它正在暫停。總之就是抱持著當下的覺察就好。

基本上，我們是留意呼吸最明顯的部位，但我剛剛引導的都是以鼻孔前緣的氣息為主。那假設對你來說，比較明顯的是腹部的起伏，或者胸口的擴張，它依然可以成為你留意的對象，都可以的。

沒有什麼不得了的，沒什麼了不得的。過去的都已經過去了，未來的也還沒到來，你現在唯一要做的這件事，就是感覺這個身體，正以這樣的姿勢坐在這裡，然後觀察你的呼吸。

[06:20 - 06:32]

很有耐心的，繼續的練習，這段空白的時間，就是要你去觀察呼吸的。

[06:33 - 07:34] (Blank 1)

[07:35 - 09:54]

你可能已經發現，雖然你希望把注意力放到鼻孔前緣，或者是其他呼吸明顯的部位，可是你的心沒有這麼聽話的，或許你剛才已經在想一些其他的事情了，可能是過去的回憶、未來的計畫等等，你會有很多的念頭想法出現在你的腦海當中，請記得這是非常正常的，不要自責，不要氣餒。

我們開始練習的時候，不要期待心如止水或著頭腦一片空白，我們要做的是發展覺察的能力，當有念頭想法出現的時候，我們覺察到了，嗯很正常啊，本來就會有一些念頭想法，覺察到之後，當下回到呼吸就好。當你在想東想西的時候，你的呼吸也沒有暫停的，所以一旦你發現了，不要自責，而是很開心的，哦，我發現了。然後當下立馬看看氣息正在往裡吸還是往外吐。

所以我們在做這個練習的時候，不要把目標設定在你的心都不會飛出去，而是把目標設定在當心飛出去之後，你發現了，輕輕的帶回來。

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假設又再出去了，沒關係，你就又再回來就好。其實沒有什麼不得了，沒什麼了不得的。你就只管坐著，感覺這個身體坐在這裡。

也沒有要消滅念頭，而且很好奇的回來呼吸，保持著開放，保持在當下，保持著留意現在的呼吸，並且開放的允許所有一切如其所是的存在，就只管坐在這裡觀察、呼吸。

[09:55 - 11:31] (Blank 2)

[11:32 - 12:10]

我們的練習，即將告一段落。你可以把身體稍微動一下，感覺你的身體正在移動，感覺當下的自己，並且接納當下的自己。因為現在，不管剛剛怎麼樣，你現在還有呼吸的，所以恭喜大家能夠完成這樣子的練習。在這邊衷心的祝福大家都能夠健康、平安、自在，恭喜你們，也祝福大家。

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Appendix D - Definition of six workload-related factors

NASA-TLX
Definitions of six workload-related factors

Mental Demand (low/high)
How much mental and perceptual activity was required (for example, thinking, deciding, calculating, remembering, looking, searching, etc.)? Was the task easy or demanding, simple or complex, forgiving or exacting?

Physical Demand (low/high)
How much physical activity was required (for example, pushing, pulling, turning, controlling, activating, etc.)? Was the task easy or demanding, slow or brisk, slack or strenuous, restful or laborious?

Temporal Demand (low/high)
How much time pressure did you feel due to the rate or pace at which the tasks or task elements occurred? Was the pace slow and leisurely or rapid and frantic?

Performance (good/poor)
How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)? How satisfied were you with your performance in accomplishing these goals?

Effort (low/high)
How hard did you have to work (mentally and physically) to accomplish your level of performance?

Frustration Level (low/high)
How insecure, discouraged, irritated, stressed, and annoyed versus secure, gratified, content, relaxed, and complacent did you feel during the task?

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Appendix E - Interview questions

For experimental group:
實驗組：

Q1
On a scale of 1 to 7, how difficult would you rate the first speech?
請評估第一個演講的難易度，以 1 到 7 來評分，1 是極為簡單，7 極為困難。

Q2
On a scale of 1 to 7, how difficult would you rate the second speech?
請評估第二個演講的難易度，以 1 到 7 來評分，1 是極為簡單，7 極為困難。

Q3
On a scale of 1 to 7, how familiar are you with the topics of the two speeches?
請問您對演講主題的熟悉程度？請以 1 到 7 來評分，1 極為熟悉，7 極為不熟悉。

Q4
Did you fall asleep during the meditation practice?
請問您在正念呼吸的練習過程中是否睡著？

Q5
If so, during which part?
如果有的話，大概在哪個階段？

Q6
Please rate your effort on following the directions throughout the twelve-minute guided breathing exercise. On a scale of 1 to 7, 1 represents not at all and 7 represents 100%.
請問剛才正念呼吸音檔的指示，是否容易理解以及跟上？請以 1 到 7 來評分，1 是完全可以理解並跟上，7 完全無法理解和跟上。

Q7
On a scale of 1 to 7, 1 represents not at all and 7 represents 100%, please rate how much you think the induction affect your second performance.
請教剛才正念呼吸練習對第二段逐步口譯的影響程度，以 1 到 7 來評分，1 是完全沒有影響，7 是完全有影響。

Q8
If you think it has an effect, please elaborate on how you think the induction affect your second performance.
如果有影響的話，請說明是什麼樣的影響。

Q9
Any feedback about the induction.
對於正念呼吸練習的感想。

Q10
Have you had any prior experience with experience?

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之前是否有任何冥想的經驗？

Q11
Please describe the type of meditation you practice, how long and how often you practice it.
如果有的話，請說明是哪種類型的冥想，您從事的時間長度及頻率。

Q12
What do you usually do to cope with anxiety before an interpreting task?
平時做口譯之前如果覺得緊張焦慮，通常會做什麼來緩解？

Q12
Any feedback about the experiment.
對於實驗的感想。

For control group:
對照組：

Q1
On a scale of 1 to 7, how difficult would you rate the first speech?
請評估第一個演講的難易度，以 1 到 7 來評分，1 是極為簡單，7 極為困難。

Q2
On a scale of 1 to 7, how difficult would you rate the second speech?
請評估第二個演講的難易度，以 1 到 7 來評分，1 是極為簡單，7 極為困難。

Q3
On a scale of 1 to 7, how familiar are you with the topics of the two speeches?
請問您對演講主題的熟悉程度？請以 1 到 7 來評分，1 極為熟悉，7 極為不熟悉。

Q4
What did you do or try to do during the waiting time?
請問您在中場休息時間做了些什麼，或原本預計做什麼？

Q5
For control group:
On a scale of 1 to 7, 1 represents not at all and 7 represents 100%, please rate how much you think the break time affect your second performance.
請教剛才中場休息對第二段逐步口譯的影響程度，以 1 到 7 來評分，1 是完全沒有影響，7 是完全有影響。

Q6
What do you usually do to cope with anxiety before an interpreting task?
平時做口譯之前如果覺得緊張焦慮，通常會做什麼來緩解？

Q7
Any feedback about the experiment.

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對於實驗的感想。

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Appendix F - STAI form Y-1 and Y-2

SELF-EVALUATION QUESTIONNAIRE **STAI Form Y-1**
Please provide the following information:

Name_____Date_____S_____
Age_____ Gender (*Circle*) **M** **F** T_____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

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SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name_____ Date_____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I feel satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am “calm, cool, and collected”	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn’t matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can’t put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

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Appendix G - Consent Form

受試者同意書

研究主題：口譯學生之逐步口譯表現
研究者：李佳純
研究目的：欲瞭解口譯學生之逐步口譯表現
研究方法與程序：
本研究採用準實驗研究設計，包含兩個階段，第一階段為逐步口譯，共有兩段約五分鐘之英文演講，每段口譯結束後填寫兩份問卷，兩段口譯中間有大約 12 分鐘之休息時間。第二階段為半結構化回顧性訪談。實驗總長約一個小時。實驗過程會收集錄音、錄影資料及問卷結果，作為研究分析。
研究效益：研究結果可供專業口譯員及口譯學生參考，本實驗亦有助於逐步口譯學生學習。
研究材料運用規劃及機密性：口譯過程及訪談之影音檔、問卷及逐字稿，以及研究者之觀察和紀錄，都將以代碼註記，妥善保存在研究者設有密碼的電腦裡，所有資料純粹作為學術研究，未來論文內容提及研究對象時，會以匿名形式發表，絕不會洩漏任何個人資料。
研究參與者權利：研究者已妥善說明研究內容及相關資訊，若有疑問請直接詢問，或透過 e-mail：sand.blind@gmail.com 與研究者聯絡。本同意書為一式兩分，其中一份由您留存。

若您願意參與本研究，請在下欄簽名，表示您已閱讀以上說明並同意參與。研究過程中可隨時撤回同意書或退出研究，不需任何理由，口頭告知研究者即可。研究結束若有任何問題，也可透過 e-mail 隨時與研究者聯絡。

研究參與者簽名：_____

日期：_____年_____月_____日

研究人員簽名：_____

日期：_____年_____月_____日

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