We present a set of terminology to:

- Highlight the disparate nature of each measure
- Address some of the ambiguity in the literature
- Help avoid misleading comparisons when discussing the literature

### Proposed terminology

#### Perceived listening effort
To denote subjective measures of listening effort as indexed using self-rating scales/questionnaires.

#### Perceived listening fatigue
To denote subjective measures of listening-induced fatigue as indexed using self-rating scales/questionnaires.

#### Auditory processing efficiency
To denote correct response latency in single-task listening paradigm (faster responses = greater auditory processing efficiency).

#### Auditory processing cost
To denote response decrement on a secondary task (in a dual-task paradigm) with speech processing as a primary task.

#### Cognitive listening fatigue
To denote general performance decline (RT or accuracy) from the beginning to the end of a listening task.

#### Physiological cost of listening
To denote changes in physiological state as a function of changes in listening task demand.

See ‘Table 1’ for example of how the proposed terminology can be applied to previous literature.

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**Introduction**

Listening effort refers to the exertion of mental power required to attend to and understand an auditory message. Listening-related fatigue refers to a feeling of tiredness/lack of energy following effortful listening.

Hearing-impaired individuals commonly report listening-related fatigue which negatively affects their daily life.

An objective measure of listening effort may be useful for audiologists assessing a patient’s hearing disability.

**So, what is the problem?**

There is ambiguity in the literature regarding what we mean when we discuss listening effort/fatigue.

A variety of subjective (e.g., self-report scales/questionnaires), behavioural (e.g., response time/dual-task measures) and psychophysiological (e.g., pupillometry, skin conductance, EEG) techniques have been used to measure both listening effort and fatigue.

However, each technique appears to be indexing disparate phenomena:

- **Subjective**: The perceived experience of listening effort/fatigue
- **Behavioural**: The presumed behavioural consequence of listening effort/fatigue
- **Psychophysiological**: The physiological mechanisms that underpin listening effort/fatigue

For example, studies have shown no relation between:

- Subjective and behavioural measures (Larsby et al. 2005)
- Subjective and psychophysiological measures (Zekveld et al. 2011)

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**Conclusions**

- Listening effort and fatigue measurement has been conducted using three distinct measurement techniques: Subjective, behavioural and psychophysiological.
- Each of the three techniques appear to be measuring disparate listening effort and fatigue-related phenomena.
- We set out a framework for understanding this topic and standardising the terminology used.

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**References**

Hornsby, B. W. 2013. E&H.