

English Corner 4: **based on** and **on the basis of**

The phrases **based on** and **on the basis of** are often used interchangeably but should not be, because **based on** is a **participle** (a *verbal adjective*), which can define a **noun**, **pronoun** and **noun phrase** (but not a **verb**) whereas **on the basis of** is a *prepositional phrase*, which can define a **verb**. Examples of the different information transmitted by their correct usage are [The administration sent a document **based on** your suggestion] and [The administration sent a document **on the basis of** your suggestion]. In the former, **based on** rightly describes the nearest **noun** (a **document**) and so tells us that you had something to do with the **content** of the document; in the latter, **on the basis of** describes the **verb** (to send) and tells us that the idea of **sending** the document (rather than perhaps taking it in person) was yours.

Based on following a passive verb

- In [The experiments *were designed* **based on** our previous results], the participle **based on** cannot describe the **verb**, as probably intended by the writer, but only the nearest **noun** (*experiments*): but were the experiments based on the previous results?
- If you wish to emphasise the designing of the experiments (the **verb**), then a **prepositional phrase** is needed [The experiments *were designed* **on the basis of** our previous results].
- However, if you do intend to emphasise the **experiments** and wish to keep **based on**, it requires a **noun** to define, and the noun most appropriate here is related to the verb used [The *design* of the experiments was **based on** our previous results. The *experimental design* was **based on** our previous results].

Incorrect related words

- **Based on** is frequently used to introduce a noun to which it should not formally be connected, *i.e.* it is an example of a **dangling** participle. In [**Based on** the MALDI-TOF results, *testicular proteins* were given a unified nomenclature] the nearest **noun** that the **participle** can complement is **testicular proteins**. This gives the incorrect meaning that the **testicular proteins** were **based on** the MALDI-TOF results, whereas it was their **nomenclature** that was so defined. This is easily corrected by using a **prepositional phrase** to define the **verb** [**On the basis** of the MALDI-TOF results, testicular proteins *were given* a unified nomenclature].
- Similarly, in [**Based on** these criteria, *the abstracts* should be ranked for their eligibility for the poster session], **based on** complements the nearest **noun**, which is **abstracts**. The incorrect meaning here is that the **abstracts** were **based on** the criteria, whereas the criteria were intended to be used to provide the abstracts' **rankings**. This is provided by the use of the **prepositional phrase** which defines the verb [**On the basis** of these criteria, the abstracts *should be ranked* for their eligibility for the poster session]. A shorter way of saying the same thing is to use a **preposition** rather than a **prepositional phrase** [**From** these criteria, abstracts should be ranked for their eligibility for the poster session].

Unclear related words

- Another example requires more thought. In [We isolated stem cells in the human prostate **based on** cell surface markers], the participle **based on** has several nouns it could define, **we**, **stem cells**, and the **prostate**. None of them can convincingly said to be **based on** cell surface markers. If the more reasonable supposition is true, that the manner in which we isolated the cells was **based on** cell surface markers, then a **prepositional phrase** is needed to define the **verb** [We *isolated* stem cells in the human prostate **on the basis of** cell surface markers].
- Alternatively, **based on** can be retained if the sentence is restructured so that the **participle** correctly describes a **noun** as the subject of the sentence, and the most relevant noun is one related to the verb used [The *isolation* of stem cells in the human prostate was **based on** cell surface markers].

Implied relationships

- A more thought-provoking case is when a human judgement is implied from observations. [**Based on** changes in their immuno-cytochemical expression, the function of Sertoli cells **developed** in the neonate], is incorrect for many reasons. First, the closest **noun** for **based on** to define is **Sertoli cell function**, and a function cannot express antigens. Second, **their** immuno-cytochemical expression is **plural**, but **function** is **singular**, but this at least suggests that the **plural** Sertoli **cells** were most likely intended as expressing the antigens of interest. Third, although only immuno-cytochemical observations were made, a conclusion about the **development** of the cells was made from them, so there must be some unexpressed relationship between changes in antigen expression and cell development.
- This sentence can be rewritten in several ways to provide clearly the meaning, the first two maintaining the original thought sequence.
- Using a **prepositional phrase** and an **auxiliary verb** [On the basis of the changes in immuno-cytochemical expression of Sertoli cells, their function **was judged to develop** in the neonate].
- Using a **prepositional phrase** with a **human element**, either explicitly in the **active** voice [On the basis of the changes in the immuno-cytochemical expression of Sertoli cells, **we concluded that** their function **developed** in the neonate] or implicitly in the **passive** [On the basis of the changes in the immuno-cytochemical expression of Sertoli cells, **it was concluded that** their function **developed** in the neonate].
- Re-ordering the sentence by placing the cell of interest first, described by an **adjectival phrase** [The function of Sertoli cells, **assessed from their changing immuno-cytochemical expression**, **was judged to develop** in the neonate].

Misleading word order

- In [Two pairs of primers **were synthesised based on** the sequences of these two fragments], the grammatical error in the sentence is rapidly detected: **based on** is a participle (verbal adjective) close to, and possibly meant to define, a **verb** (**synthesised**). However, it is not clear whether the **primers** or their **synthesis** were dependent on the fragment sequences.
- If the **synthesis** is to be stressed, a **prepositional phrase** is needed to define the **verb** [Two pairs of primers **were synthesized on the basis of** the sequences of these two fragments].

- If the primer **design** is to be stressed, **based on** can be retained in sentences rewritten with another *noun* for **based on** to describe [The *design* of two pairs of primers was **based on** the sequences of these two fragments], to include an adjectival phrase [Two pairs of primers, **based on** the sequence of these two fragments, were synthesised] or with omission of *synthesised* [Two pairs of primers were **based on** the sequences of these two fragments].

By Dr Trevor G Cooper (ctrevorg@gmail.com)