**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)