

Interactive decision trees for teaching and learning of Northern Sotho colour terms

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This paper suggests a decision tree strategy for the teaching and learning of complicated grammatical and semantic structures in Northern Sotho with colour terms as a case in point. Two separate lexicons for colour terms are distinguished for Northern Sotho, one referring to what can be called general colour terms (henceforth referred to as Lexicon A), and a second one (Lexicon B), which is traditionally regarded as a closed subsystem, the use of which is reserved for the description of the colours and colour patterning of mainly cattle, but also of other domestic animals. It will be argued that traditional grammar books and paper/electronic dictionaries are insufficient and user-unfriendly with respect to the treatment of these colour terms and that learners need an interactive, versatile and more entertaining approach to the learning of colour terms in Northern Sotho. The focus will be on three aspects, i.e. (a) the complex structure, extent and range of application of these terms in Northern Sotho, (b) description of the suggested decision tree technology and (c) a working model of interactive learning of colour terms through decision trees including an element of edutainment. The teaching and learning objectives are (a) cognitive knowledge, (b) text receptive use and especially (c) text productive use of Northern Sotho colour terms. In this regard, the teacher must find ways to teach general colour terms, the great variety of colour terms describing cattle, the use of the latter for the description of objects other than cattle and/or domestic animals and the fairly complicated grammatical constructions for the different noun classes.

With reference to the contents of the two colour lexicons, Lexicon A can be divided into what Berlin and Kay (1969) call basic colour terms i.e. *-hubedu* ‘red’, *-šweu* ‘white’, *-so* ‘black’ and *-tala* ‘grue’¹, and non-basic colour terms, e.g. *serolane* ‘yellow’, *modipa* ‘orange’ and *pinki* ‘pink’. Lexicon B would include terms such as *-nala* ‘red and white’, *-kgwadi* ‘black and white’ and *khulong* ‘reddish brown’.

The widely divergent views of scholars with regard to the semantic content of the terms belonging to Lexicon B are immediately evident as indicated in the following sample:

Term	Louw (1957)	Mönnig (1978)	Nokaneng & Louwrens (1988)	Ziervogel & Mokgokong (1975)	Kriel and Van Wyk (1989)
-hlaba	yellowish red	red with brown spots	red all over mixed with black	fawn with brown on neck and back	light brown
-kebja	light grey	white with red spots	grey mixed with indistinct black	red or brown with tiny red spots	red or brown with white spots
-phaswa	black and white	red with small white marks	black with white belly	black with white spots on flanks	black and white

The first challenge for the teacher is to find a way to guide the learner in a more consolidated way, e.g. by determining the critical mass through a genus-differentiae approach, and to guide the users to the different possible meanings in a user-friendly way.

A decision tree strategy for step-by-step interactive learning will be presented, (cf. figure 1, below), based upon the model developed by Prinsloo, Heid, Bothma and Faasz (2011) for copulatives and Prinsloo and Bosch (2012) for kinship terminology in Northern Sotho and Zulu. Teaching colour terms by means of decision tree structures ensures that the user does not have to study the entire system with all its variations for a given situation but that (s)he is guided by means of a direct route to the required information.

¹ ‘grue’ refers to a cover term used in languages which use the same term to refer to both blue and green.

There are different technological and design solutions for implementing structured paths and decision trees. This includes “standard” SQL-based database technologies, combined with XML, HTML5 and data presentation languages. How this can be implemented and the advantages and disadvantages of the proposed solution will be discussed briefly. The proposed solution has a database entry for each item. These entries contain the metadata describing the entry as well as a reference to the parent node. The presentation of the tree consists of selecting a node, and then finding (based on parent node reference) each child node. The tree could be rendered depth or breadth first (up to a certain level). In the proposed solution all the data will be stored and managed on the server, with a web interface for rendering and maintenance. Only the required data segments will be sent to the client. In the current implementation this is JSON, but XML could also be used. For the visual presentation of the tree, the proposed technology is SVG. The elements of the tree are rendered dynamically on the screen using JavaScript. Another option would be to export the entries to XML and then to make use of XSLT for presentation. The proposed solution will be demonstrated with a working prototype for colour term selection as well as for the copula in Northern Sotho. A template to simplify the construction of a structured path or a decision tree will also be demonstrated.

A variety of decision tree options will be proposed. The most prominent access routes will be through the different colours and the nature of the object being described: cattle vs. other animal vs inanimate object, as shown in figure 1.

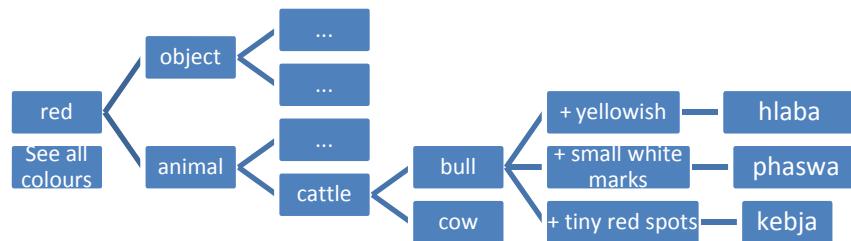


Figure 1: The colour *red* as point of departure: lexical selection for the description of animals.

A second point of departure is the colour term itself and the nouns that can be described by means of the specific colour term as in figure 2:

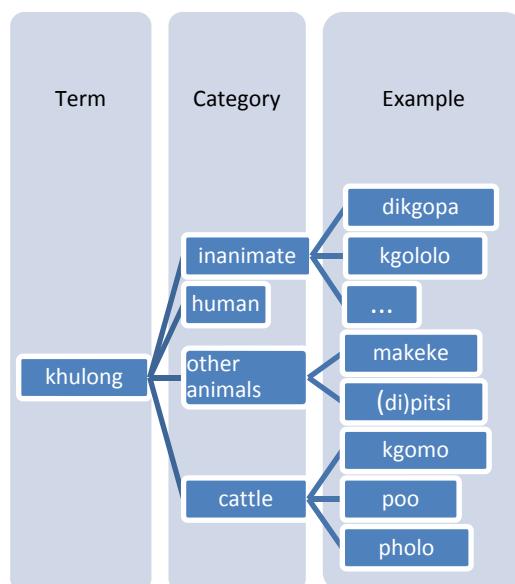


Figure 2: The colour term *khulong* as departure point for inanimates, cattle and other animals.

A third point of departure and basic strategy for cognitive information is the noun class system, concordial agreement and the nature and extent of the adjective construction used for the expression of colour. Clickable options to different sub-menu levels for further guidance in terms of morphology, syntax and semantics, colour pictures of the objects and animals as well as comparison options with the other Sotho languages will be provided, cf. figure 3.

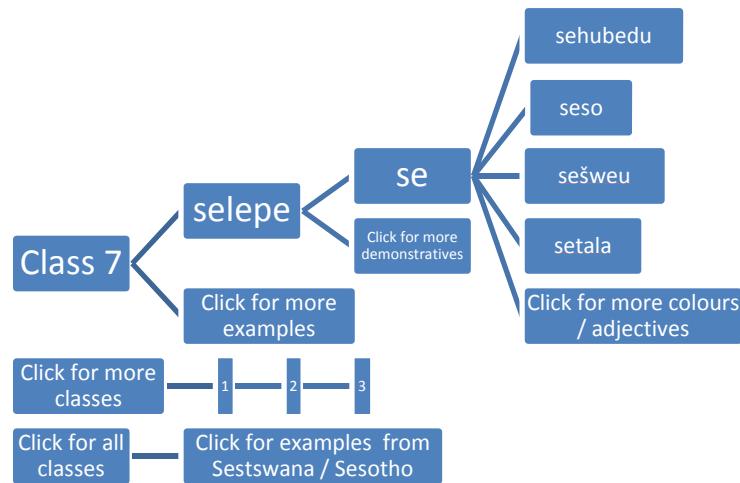


Figure 3: Structure of the Northern Sotho adjective containing colour terms for Class 7 with certain clickable options for more information.

Provision will also be made for an edutainment component simply to make learning colour terms more enjoyable for learners.

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