14.1 Introduction[1]

This chapter will focus on the subject of fieldwork research addressing mathematical concepts developed in elaborated traditional knowledge. Its goal is to give advice to fieldworkers from this particular point of view, and to draw their attention to methodological issues with respect to the completeness of data collection during fieldwork and the veracity of the interpretations and analyses subsequent researchers are able to undertake without visiting the field. There is a wide range of activities which might evince mathematical structures such as games (e.g. cat's cradle), kinship structures, poetry, riddles, art and design, music. All belong to the intricate landscape that is ethnomathematics. Their full description involves mathematical concepts taken from various fields such as number theory, geometry, graph theory, algebra, or combinatorics on words. For instance, Stevens (1981) provides a rich collection of two-dimensional patterns from various parts of the world classified according to the crystallographic notions of symmetry. Such a book does not deal with fieldwork, and nothing is said about how to collect such patterns and how native artists conceive them. The same holds for more recent books on a similar subject (see e.g. Horne 2000). Even in works more related to the ↳ 'ethno' dimension of ethnomathematics, such as the website *Ethnomathematics in Australia* (Rudder n.d.), the methodology for fieldwork is not dealt with, since these studies are partly motivated by an educational concern about how to teach Western mathematics to Indigenous students. It appears that most of the work in ethnomathematics falls into one of these two categories. Either they are based on existing fieldwork data collection studied by subsequent researchers who have not visited the field, or they are made by fieldworkers working in the particular context of educational activity. As there exist only few studies in ethnomathematics that take account of fieldwork problems, this chapter is restricted to concrete examples, most of them encountered during our fieldwork conducted on the mathematics of divination in Madagascar. It is worth mentioning that many ethnomathematical topics are not covered. Thus the presentation of the Malagasy research takes up a large proportion of this chapter. This is not the place for primary presentation of such a practice and the reader is referred to other papers published elsewhere (Chemillier et al. 2007; Chemillier 2007; 2009). In this chapter I provide some basic definitions to explain the way mathematical concepts are extracted from fieldwork situations.

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What is involved in doing mathematics? When playing the cat's cradle game, are the participants doing mathematics or merely engaging in an intricate cultural activity? When we layer western mathematical analyses on the playing of the game, is this 'doing mathematics'? None of these cases corresponds to what we will call 'doing mathematics'. In this chapter, I will refer to the definition of ethnomathematics given by Ascher and Ascher (1986: 125) as 'the study of mathematical ideas of nonliterate peoples'. When someone plays the cat's cradle game, he may only repeat known figures without developing mathematical ideas about them. In the same way, the use of western mathematical concepts to analyse traditional activities does not prove that these activities require mathematical ideas from people doing them (just as the use of symmetry groups in the study of crystal structures does not prove that minerals can have mathematical ideas!). The kind of ideas that we are interested in when doing ethnomathematical fieldwork can be characterized by the following features inspired by Pascal's definition of the 'mathematical mind' (Pascal 2008[1660]: 23). First of all, they are based on principles which are explicit and that one can see fully (e.g. the rules of the Malagasy divination system). Secondly, these principles are removed from ordinary use, and in some cases, there is a shift from reality to abstract speculation by introducing artefacts such as pebbles, notched sticks, knotted cords, seeds (as in the case of Malagasy divination), lines traced on the sand, strings plucked to play music. Note that these artefacts are of no mathematical importance as individual objects, because what is relevant here is their relationship at an abstract level. The third feature of mathematical ideas derived from these principles is that they proceed in a detailed, linear, systematic fashion following a deductive mode of reasoning. As we will see, these three features have direct consequences for fieldwork researchers, in

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