1. Introduction. E.De Giorgi uses to deliver very original lectures during his courses at Scuola Normale Superiore in Pisa. Among the many subjects he dealt with, we recall that the course of the academic year 1971-72 was mostly devoted to the theory of exterior measures. Some of it was collected in the “Quaderno della Scuola Normale” [2]; namely Chapter 3 contains the fundamentals of exterior measures (following mostly Carathéodory’s approach [1]), while chapter 4 contains the definition of an original geometric measure, used to solve problems of minimal surfaces with obstacles.

The course of the following year, unfortunately not available but as handwritten notes, dealt with a general theory of exterior measures. Particular stress was laid upon the theory of exterior integral for functions whatsoever. In particular it could be found there a subtle analysis of the possible definitions for the measurability of functions, and a clear partition between those properties of the integral which still hold in absence of measurability and those that get lost.

Some years later, during a course that I held at ISAS in Triest,
I happened to repeat some parts of De Giorgi's course of the year 1972-73; so I had the problem of finding examples both suitable and convincing.

Everybody that teaches measure theory knows that, speaking of Lebesgue-Stiltjes measure, it is very hard to exhibit convincing counterexamples arising from the non measurability of the functions. As a matter of fact one should use an exterior measure (hence endowed with countable sub-additivity), where there are "few" measurable sets, but not "too few", and at the same time this measure should not be too abstract, in order that computations could be easily performed and not only believed to exist.

An exterior measure that seems to enjoy all these properties is at hand, but it appears to be so trivial that it be good only for the examples given to the students during a lecture, not even to be written on a text-book.

A fortiori it should not even be mentioned in a scientific paper. It is only thanks to computer science that it achieves its right to an official life out of the darkness of triviality. Actually in the last two years, while working to applied problems of pattern recognition and of optical character recognition (OCR), I remarked that this measure, so poor at first sight, appears to have really deep meanings.

What is important, as we shall see later, is just its enormous richness of (constructable) non measurable sets. This fact reverts to some extent the traditional way we look at measure theory, where non measurable sets are considered rather a regrettable accident. Even more in most theories we start quite from a $\sigma$-algebra of subsets and we define the measure only on this $\sigma$-algebra, defining the exterior measure only as a generalization of the "good" measure.

The computer science arguments that I shall introduce later were based not only on the theoretical computer science but also on the study of perception psychology. This is a field in which discrete exterior measures should be meaningful. They seem actually to have the power of explaining many optical illusion phenomena. I have formulated some hypotheses, specially concerning Poggendorf's illusion and similar, but as it is obvious this is a research field where wide experimentation is needed in order to get meaningful evidence; so it is too early to present undue theories now. I wish to thank Prof. G.Vicario of Padova, who introduced me to the study of perception psychology in many conversations we had at our department. I ex-