

“On the science’s wing”: zoological laboratory (I) of the formative proposal of inclusive scientific divulgation

I.A.S-C.N.R. di Capo Granitola



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S. Bondì^{a,b}, A. Adamo^{a,b}, G.M. Armeri^{a,b}, C. Bennici^{a,b}, G. Biondo^{a,b}, M. Di Natale^{a,b}, S. Ferraro^{a,b}, A. Giannettino^c, C. Patti^{a,b}, T. Masullo^{a,b}, S. Russo^{a,b}, M. Torri^{a,b}, F. Vaccaro^{a,b}, G. Virga^c, A. Cuttitta^{a,b}.

- a Laboratorio Creativo di Divulgazione Scientifica – EDU Lab - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino del Consiglio Nazionale delle Ricerche (IAS-CNR), SS di Capo Granitola, via del Mare 3 – 91021, Torretta Granitola (Campobello di Mazara, TP), Italia;
- b Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino del Consiglio Nazionale delle Ricerche (IAS-CNR), SS di Capo Granitola, via del Mare 3 - 91021 Torretta Granitola (Campobello di Mazara, Tp), Italia.
- c Istituto dei Ciechi Opere riunite I. Florio – F. ed A. Salamone” di Palermo

Introduction

The scientific divulgation work is increasingly like a facilitator task. In fact, in this work it is primary to transform the results and the notions of scientific research so that they became accessible to the public, understood as the largest possible number of people. However, this information flow turns out to be purely verbal, moreover with a language rich of visual references, that are inaccessible and incomprehensible for the user with sensory disabilities. Wehavethusestablished a convention between the “Istituto dei Ciechi

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Opere riunite I. Florio – F. ed A. Salamone” of Palermo and the “Consiglio Nazionale delle Ricerche - Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino” of Capo Granitola (TP). We developed a formative proposal that links the science world with sensory disabilities, proposing Birds as principal argument and the whole world connected to it. The birds appear as the key to connect to different scientific issues (pollution, environmental changes, exploitation of resources) to create new knowledge in the public, through the suggestions that the workshop lessons can give people, both disabled or not. All this in order to bring them closer to these subjects and make the contents of our laboratories as inclusive as possible.

The project "The world of birds", developed from January to April 2019 is divided into three main themes, the first of which is the focus of this report: The bird plumage.

Structure of the laboratory lesson

Users who joined the project were involved by CNR researchers in short 30-minute scientific lectures, followed by laboratories (approx. 1h and 30 min) on bird plumage. Disabled users were asked to develop the "feathers" topic using environmental interpretation techniques. The discussions were developed using appropriate questions, following the "flipped classroom" method, with the auditorium shares all the knowledge of the individual elements and the divulgator fills the knowledge gaps, to give a more complete picture. They met real feathers and covering plumage. Species, habitats and in-depth descriptions of the plumage (colours, bands, ornamentations) have been specified for each feather.

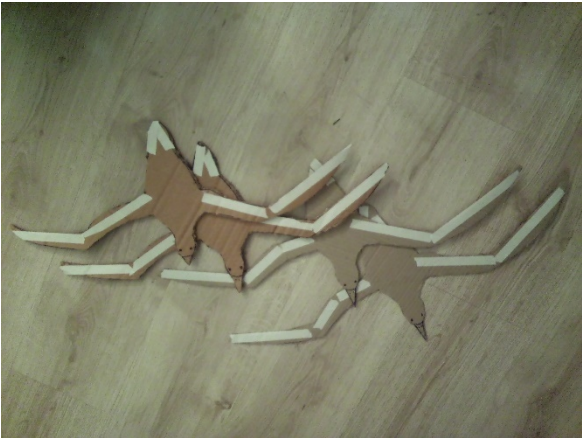


The second phase of the explanation was more technical, with the discrimination of the different types of covering feathers and feathers necessary for flight (primary and secondary wingfeathers, tailfeathers) and their different function, linked to the intrinsic properties (softness, flexibility, etc). The supporting structure, composed of the quill, was analysed by touching. Quill is the part that attaches to the body, fitting into a follicle of the skin, and from

the rachis, the continuation of the calamus. The flat surface of the flag is attached to the spine, formed by many beards, from which the barbules branching into the edges of very small hooks or eyelashes branch out (Bergmann, 1994). Divulgators explained that the mature pen of birds is a dead part, which can be considered as the hair of mammals. Real feathers cover the outside of the body, under which we find the covering feathers, which provide the birds with thermal insulation and impermeability, protecting them from water and temperature variations, even in extreme conditions. The wings and tail feathers provide the aerodynamic support necessary for the flight, as well as the control and regulation of the flight itself. These represent most of the wing and caudal surface; they have precise characteristics and are arranged in precise points (Brown et al. 1989). The laboratory was developed in a graphic and experiential manner. Each disabled user has had three different types of feathers (primary and secondary wingfeathers) to be coloured at will and cut out. All feathers were put into the community. Having reached the number of feathers used

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to make up the plumage, the different groups had a random cluster of feathers and a gliding bird shape, but without feathers on wings and tail. Users had to recognize the different types of pens from the previous explanations, applying them to the exact body portion (helmsman on the tail, flight feathers on the wings). Lectures were articulated as a moment of knowledge and discussion on issues related to birds, their ecology and their environmental protection. Laboratories, on the other hand, as felt like a "creative moment" of assimilation and personal interpretation of scientific issues, which allowed the students to improve their synthesis skills.



Materials description

“On the science’s wing” was proposed as inclusive game and not only open at people with visual impairments. Feathers are declared in thick cardboard, white in colour, with three different types of morphology per sheet. As the second step (painting) we have opted for strong colours, in order to be more detectable for the fraction of users who are not completely blind (visually impaired) or sighted but with other chromosomal sensory disabilities.

The total number of feathers was 32 per template (10 primary wingfeathers, 10 secondaries, 12 tailfeathers) for a total of 128 pens created. The shapes were coloured in recycled cardboard, with a height of 40 cm and a maximum extension of the wings of 65 cm. The hanging of the quills of the cardboard pens has occurred armed double-sided tape.



Environmental interpretation

Interesting hints came to light during the pre-laboratory lesson. The "plumage" element with all its intrinsic characteristics has allowed us to engage in broader and more general themes such as farmland pollution. In fact, the most recent researches have been mentioned which

have highlighted the presence of neonicotinoid pesticides (Humann-Guilleminot et al. 2019) or heavy metals (Innangi et al. 2019) in the feathers of the Italian sparrow *Passer italiae* and Common sparrow *Passer europaeus*.

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