INTERNATIONAL CONFERENCE ON ENGINEERING AND PRODUCT DESIGN EDUCATION
5 & 6 SEPTEMBER 2013, DUBLIN INSTITUTE OF TECHNOLOGY, DUBLIN, IRELAND

EXPLORING THE DESIGN OF MOUSETRAPS

Gunnar H. GUNDERSEN
Department of Product Design, Oslo and Akershus University College of Applies Sciences

ABSTRACT
Based on a case study of a collection of a couple of hundred mousetraps this paper presents a systematic categorisation of their principles of technical construction, material consistence and principles of function. This study of mousetraps introduces decision making involving ethical dilemmas, the discussion of intrinsic value of animals of this kind, and finally the user's need to be comfortable with the process of use. The principle of its technical construction among a large diversity of possible solutions must be chosen on the basis of a set of criteria. Equal for all traps is the demand for inclusive usability and low cost results. This criterion promotes low-tech constructions with high visual transparency. The presentation of the mousetrap study introduces in a way the general connections between material and technical constructions and moral consequences of ethical perspectives. Ethical values are guidelines in the decision making. Together with a categorisation and presentation of technical principles of mousetraps, the graphical design illustrations and text information on the belonging packaging shows in a pedagogical way how it is possible to contribute to complex issues with simple everyday objects.

Keywords: Ethical decision making, principles of construction, low-tech mechanical constructions

1 INTRODUCTION: THE CONSTRUCTION OF MOUSETRAPS

Figure 1. The Annunciation Triptych (Meerode Altarpiece). Robert Campin (ca 1375-1444) The Metropolitan Museum of Art, The Cloisters Collection

Mice have been a subject of persecution by mankind in all time [1]. In The Annunciation Triptych by Robert Campin in Figure 1, it is shown how Saint Joseph makes a mousetrap in the right panel. "The presence on the right panel of Joseph can also be explained in the context of the Incarnation. Joseph has made two mousetraps, whose meaning is elucidated by the Augustinian speculation that the Incarnation was God's means of ensnaring the devil, much as bait entraps a mouse" (Figure 1). The philosopher Augustin used the mousetrap as a metaphor. He wrote "The Lord's cross was the devil's mousetrap: the bait which caught him was the death of the Lord" [2]. The reason that mouse has been persecuted is that the mice compete mainly for food and represent a threat against people if they were not combated. It is a global phenomenon and this problem is handled in different ways. An overarching choice for eliminating mice is literally a methodical question. What kind of methodical solution is preferable? Well known methods are poison, mousetraps, ultrasound, cats or other animals which are practical solutions but sometimes controversial in animal welfare in life sciences [3].

2 ETHICAL DILEMMAS IN AN EVERYDAY PRODUCT

The designer Victor Papanek has pointed towards the designers' influence of the environment [4]. From a manufacturers perspective an ethical designer can contribute to strengthen corporate social responsibility [5]. From the users perspective they are given different positions to participate or not in decisions concerning their impact on their environment. The choice of construction, materials, concepts influence these choices which are dependent on available technology and which will have consequences for the environment and everyday publics [6]. It is an aim to find down to earth examples that can exemplify interdisciplinary challenges where pragmatic solutions can be found through bounded rationality [7].

2.1 Pedagogical perspectives

With the help of fundamental technical solutions it can be made an illustration of complex ethical issues. There is a need to do exercises questions concerning values in all professions [8]. Through the practice of research Mc Niff claims that researchers must ask what kind of values they have in their practice and the consequences that are created. This is relevant in the role of designer, manufacturer and user because ethical choices will have consequences related to the design, sale and use of the product [4]. According to Papanek a conscious choice of values will be a prerequisite for future work and is always integral factor in the design process. More visual educational materials need to be developed in relation to teaching this subject in a practical and understandable way. Therefore, the approach in this study is how ethical reflections can be developed in design education through the study of ethical dilemmas in the construction of mouse traps. This theme will prepare the student for a situation where ethical questions will be a fundamental issue for growth in the future.

3 METHOD: A CASE STUDY OF A MOUSETRAP COLLECTION

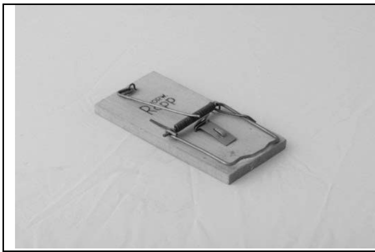
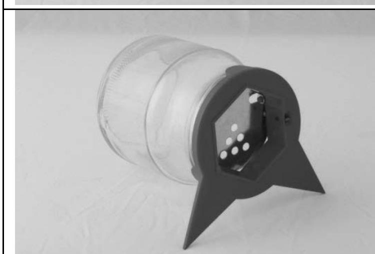
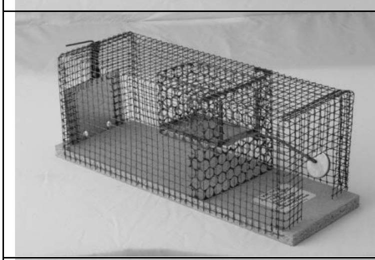
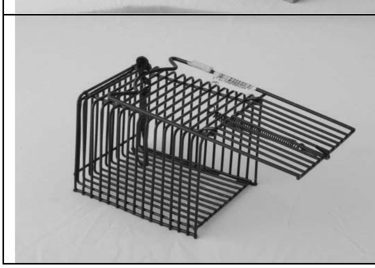
A case study [9] of a collection of mousetraps is chosen as approach to explore the research question. Traps are the base of this collection and the chosen area for the research. The collection have been used in discussions of animal welfare in life sciences [3]. People have used a lot of effort and creativity to construct different devices for trapping mice, both manufacturer and homemade traps. In the US there are more than 40000 patents [1]. There are some general criteria for these constructions. All traps have a particular focus on the demand for inclusive usability and low-cost results. This criterion promotes low-tech constructions with high visual transparency. The collection consists of a couple of hundred mousetraps and this paper presents a systematic categorizing [10] of their principles of technical construction, material consistence and principles of function [11]. A part of the collection is the packaging, illustrations and instructions for the use of the traps. Further a model of the ethical dilemmas is developed for knowledge transfer in design education [12].

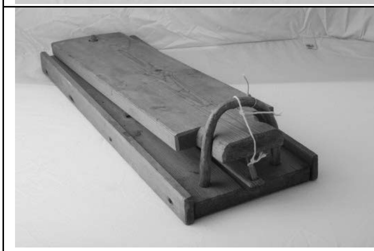
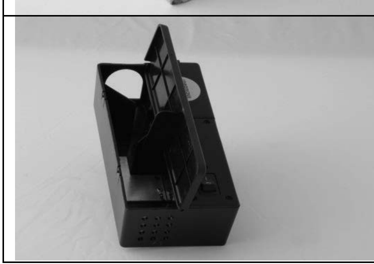
3.1 Ethical dilemma- a choice of the manufacturer, designer or user

The main principal difference of the traps is the ethical choice between life or death. It is the key ethical question/criteria for the designer/constructor to consider in the process of designing a trap. As the categorization shows, both solutions are represented in the collection. The traps have been categorized into eleven different groups which all represent different principles in solving the same functional problem [11] in this case, how to get rid of mice. The different principles are represented by archetypical examples from the collection. Some of the principles are named by the author. The names are usually connected to the function or another distinguish feature of the trap. All of the categories use different materials or combinations of materials. There are also a wide range of variations in form and sizes within the same principle. In the collection there are also examples of more than one principle are used in the same trap.

4 FINDINGS: ELEVEN CATEGORIES OF MOUSETRAPS - PRINCIPLES AND CONSTRUCTIONS

Table 1. Eleven construction principles of mousetraps

	**1 Stroke** The classic mousetrap appeared in the 1890s and was patented for the first time i USA in 1894 by William C. Hooker. Another similar trap was patented by John Mast (patentnr. 744379) in 1903.	Size: 10X10 cm. Height: 1,5 cm Material: Wood, metal Bait: Yes Capacity: One specimen Effect: Deadly Name trap: “Rapp” Manufacturer: Nordenfjeldske Børstefabrik A/S Origin: Norway
	**2 Pot** The same system that is made for trapping fish. The entrance opening becomes more and more narrow and the trapped animal can get into the trap but will not be able to get out again.	Size: Ø 14 cm Height: 10 cm Material: Galvanized steel Bait: Yes Capacity: Multiple Effect: Living Name: “Calotte souris” Manufacturer: Unknown, factory made Origin: France
	**3 Push** The mouse has to push a kind of door to get into the trap. The door locks behind it and the mouse cannot escape.	Size: 10X12 cm Height: Varies, in this case 12 cm Material: Plastic, metal, glass Bait: Yes Capacity: This model, one specimen. Name: “CombiCat” Effect: Living Manufacturer: Trap Nouvus A/S Origin: Denmark
	**4 Tilt** The mouse catches itself by its own weight. The bait is inside the trap and when the mice walk on the balanced area it will open up the trap and return to the closed position when the weight of the mouse disappears. The trap will then be set for the next mouse.	Size: 27X9 cm Height: 10 cm Material: Steel, galvanized steel, chipboard Bait: Yes Capacity: Multiple Effect: Living Name: “Godkänt fångstredskap” Manufacturer: Unknown, factory Origin: Sweden
	**5 Cage** This is a traditional animal trap. A tensioned spring release and trap the mouse when the mouse is inside the trap and start to eat the bait because the bait is connected with the release mechanism.	Size: 9X7 cm Height: 6 cm Material: Painted steel Bait: Yes Capacity: One mouse Effect: Living Name: “Mouse trap” Manufacturer: Unknown, factory made Origin: The Philippines

	**6 Throttle** A construction which is made for the mouse to hang itself. The mouse has to gnaw through a thread to get access to the bait. The thread holds a spring in tension and when the thread is broken it release a running knot and the mouse will be hanged.	Size: 5X7,5 cm Height: Wood part =3 cm. Material: Wood, steel, twine (or other kind of string) Bait: Yes Capacity: In this case two Effect: Deadly Name: “Lucifer” Manufacturer: Unknown factory Origin: France
	**7 Block weight** The mouse releases and gets a weight when it is underneath and get pinched by the heavy weight.	Size: 61X19,5 cm Height: 13 cm Material: Wood, twine Bait: Yes Capacity: One specimen. Effect: Deadly Name: “The tie” (name given by the author) Manufacturer: homemade Origin: Norway
	**8 Glue** Will make the mice stick to the trap when they enter the glue coated surface in order to get access to the bait. Exists with and without bait.	Size: 11,5X 8,5 (folded together) Height: 1,5 cm Material: Glue, plastic, bait Bait: Yes/No Capacity: Multiple Effect: Deadly, eventually Name: “Stick-em” Manufacturer: J.T. Eaton&Co.,Inc. Origin: USA
	**9 Balance** A beer or coke can is prepared with a sort of shaft for easy spin. The bait is lubricated on the can and tempts the mice to enter. This trap is usually put on the top of a bucket. When entering, the can will spin and the animal will fall into the bucket.	Size: Ø 6,5 cm Height: 11,5 cm Material: Steel, aluminum Bait: Yes (Peanut butter) Capacity: Multiple Effect: Living Name: ”Spinning Jenny” (name given by the author) Manufacturer: The author Origin: USA, (instruction)
	**10 Slide** The trap shoot the mouse into a chamber by a shovel in high speed and the mouse hits one wall. The spring system makes it possible for the trap to catch several mice in one setting.	Size: 23X18 cm Height: 14 cm Galvanized steel, plastic Bait: No Capacity: Multiple. Effect: Presumably deadly Name: “Ketch-all” Manufacturer: Kness Mfg.Co.,Inc. Origin: USA
	**11 Electric** The trap works similar to the electric chair. The animals make a short circuit by connecting the metal plates inside on the floor of the trap. It exists also for multiple catches.	Size: 15X8 cm Height: 4 cm Material: Plastic, metal, electronic Bait: Yes Capacity: One specimen. Effect: Deadly Name: “Victor - electronic mousetrap” Manufacturer: Woodtream Origin: USA

5 DISCUSSION: ETHICAL REFLECTIONS IN DESIGN EDUCATION THROUGH AN ANALYSIS OF THREE MOUSETRAP PRINCIPLES

Through a case study of how ethical reflections can be developed in design education through the study of ethical dilemmas in the construction of mouse traps a model has been developed [12] (Figure 2) to illustrate the dilemmas that can appear in different levels. Three different examples of traps are discussed in relation to trapping mice alive, where the design, packaging and illustrations can express different values in handling the animals.

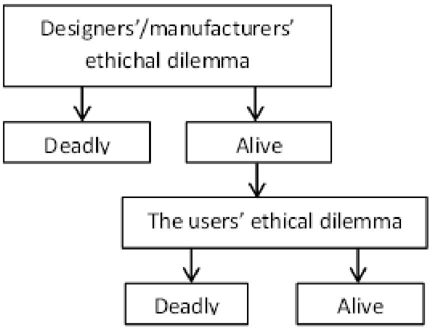


Figure 2. Model of ethical dilemmas concerning the design, production and use of mousetraps

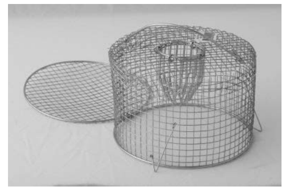


Figure 3. Pot trap from France

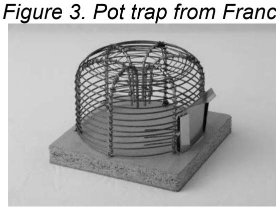


Figure 4. Pot trap from Cyprus

5.1 Communication in product semantics in mousetraps

Figure 3 show a French trap with the opening design presented. Figure 4 is an image of a trap bought in Cyprus. Both traps are categorized under category 2, Pot: The French trap (Figure 3) is made of galvanized steel, the opening mechanism are two hooks that have to be loosened. The whole bottom of the trap will be released, just hanging in a primitive hinge. The other Cyprian trap (Figure 4) with the same principal solution is built on a base of chipboard. There is a relatively narrow opening with a simple, functional and self-descriptive opening mechanism. It is a kind of door which is easy to lift up and let the mice out. Through an analysis based on material and semantics [13] of the use of material and the construction it seems like these two give certain guidelines for the destiny of the trapped mice. In Figure 3 the user gets a sophisticated message and hints of how to handle the mice, for example to kill them by drowning. The message in the semantic signs [13] can be understood through the choice of material which is water-resistant. The user is given the opportunity to open up the whole trap and it is in fact easier to get rid of dead mice than alive. Figure 4 on the other hand have a material combination that prevents the user to put the trap in water, simply because chipboard will dissolve in water. The narrow opening also makes it extremely complicated to empty the trap for dead animals. One principle, two similar shapes, but with two different guidelines of solution for the user of how to deal with the trapped mice, just by the choice of materials and details of the construction.

Figure 5. Part of user manual, Danish trap

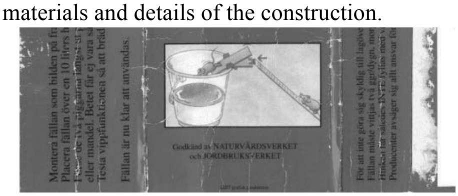


Figure 6. Part of user manual, Swedish trap

5.2 Placement of ethical dilemma

In the next example (Figure 5) it is entirely up to the user to decide the matter of life and death of the animal by suggesting to let the mouse free or to kill it by exhaust. This is a Danish trap of the principle no. 3, Push. In this case is the instruction on the package the additional empirical documentation which make a basis for the analysis. The solution raises an ethical dilemma where the manufacturer transfers the decision of life and death to the user of the trap. Like Pontius Pilatus in Matthews 27:24: “Pilate saw that he wasn't getting anywhere and that a riot was developing. So he sent for a bowl of water and washed his hands before the crowd, saying, "I am innocent of this man's blood. The responsibility is yours!"»[14].

5.3 Double communication through user manuals

The last example (Figure 6) is a Swedish trap, a version of category 4, Tilt. This trap is designed to be used inside a bucket. In the instruction leaflet the manufacturer in this case quote the Swedish law. Such as the required emptying of the trap twice a day and the prohibition against the use of different liquids, like water, glycol etc. in the bucket. The manufacturer disclaims any responsibility for how the trap is used. There is an illustration on the same leaflet that instructs the use of the trap on the top of a bucket. In that illustration is the bucket halfway filled with some sort of liquid. The message is both to protect the manufacturer and to inform on how to do, and what to use. This is a kind of double communication. The question is if the real message is to inform the users about possible ways of using the trap, rather to inform about the illegality of some specific use.

5.4 Conclusion: Educational elucidation of ethical dilemmas in design construction

As a conclusion to the research question the model (figure 2) shows how ethical choices and values in the design process can be placed on different levels through the design. Furthermore the practical illustrations show how the interplay of material choices and product constructions make semantic signs of high impact. This confirms the relevance and presence of the ethical dilemmas in design practice [5, 15]. The presentation illustrates in a visual way the ethical dilemmas on different levels that designers, manufacturers and users meet. It is a pedagogical approach to the theme for design practitioners. It is a pedagogical way to elucidate ethical dilemmas which can emerge in many levels in professional practice [8].

REFERENCES

[1] Fredga K. *Fällor för råttor, møss och sork [Traps for rats, mice and voles]*. Växtskyddsnoticer [Plant protection notices]. 1999;63(4):6.

[2] Augustine SA. On The Victory Over Death/Sin/Devil. *In: Bettenson H, editor. The Later Christian Fathers, A Selection From the Writings of the Fathers from St Cyril of Jerusalem to St Leo the Great Oxford:* Oxford University Press; 1977.

[3] Engeland S, Kjæstad HP, Grøndahl AM, Karlsson A-C, Mejdell CM. *Dyrevernmessige konsekvenser ved bekjempelse av rotter og mus [Animal welfare consequences in controlling rats and mice]:* National Veterinary Institute2010. Report No.: 12.

[4] Papanek V. Design for the real world : human ecology and social change. Frogmore, St Albans, Herts: Paladin; 1977.

[5] Melles G, de Vere I, Misic V. Socially responsible design: thinking beyond the triple bottom line to socially responsive and sustainable product design. *Codesign-International Journal of Cocreation in Design and the Arts*. [Article]. 2011;7(3-4):143-54.

[6] Marres N. Material participation : technology, the environment and everyday publics: Basingstoke: Palgrave Macmillan; 2012.

[7] Simon HA. The sciences of the artificial. Cambridge, Mass.: MIT Press; 1981.

[8] McNiff J. Action research for professional development. Dorset: September Books; 2010.

[9] Yin RK. Case study research: design and methods. Thousand Oaks, Calif.: Sage; 2009.

[10] Maxwell JA. Qualitative research design : an interactive approach. Thousand Oaks, Calif.: Sage Publications; 2005.

[11] Tjalve E. Systematisk udformning af industriprodukter : værktøjer for konstruktøren [Systematic design of industrial products: tools for the constructor]. København: Akademisk Forlag; 1976.

[12] Jørgensen K. Videnskabelige arbejdsparadigmer [Scientific work paradigms]: Institut for Production, Aalborg Universitet, Denmark; 1992.

[13] Monö R. Design for product understanding: the aesthetics of design from a semiotic approach. Stockholm: Liber; 1997.

[14] Publishers HB. The Holy Bible. Nashville: B&H Publishing Group; 2010.

[15] Papanek V. Design for the real world : human ecology and social change. London: Thames & Hudson; 1985.