

8th BNU CHAMPIONSHIP IN EXPERIMENTAL SCIENCE (2016)



- The Championship is open to everybody, whether undergraduates, graduates or faculty members.

- In principle the participants should form teams of 2, 3 or 4, but it is also possible to take part alone.

- *Participation in this Championship should not be seen as a kind of home work that can be done in 2 or 3 evenings just before the deadline. As it is supposed to be an initiation to research and discussion, it requires that one tries several approaches and methods before choosing the most appropriate. It is this method that the participants will present in the end-report after a brief description of the other methods that proved less satisfactory.*

- One of the objectives of the Championship is to convince the participants that the experimental methods which have proved highly successful in physics can also be used successfully in the social sciences.

- The best groups will receive an award. Basically, there will be one first prize and one (or possibly more than one) second and third prizes. Moreover, all groups who have taken part with determination will receive a certificate of participation and a souvenir-gift.

- Participants are encouraged to discuss with the organizers or with other faculty members, for instance if they do not know exactly how to start or if they face an obstacle. Because, nobody (including the organizers) knows the solutions of the

problems that are proposed, such discussions should not be seen as making the competition unfair. The overall objective is that students and faculty members team together in order to solve the problems.

- Toward the end of the Championship there will be a *Night of Experimental Science* to which all students who did not take part in the Championship are invited. The participants will show how their experiments work and will answer any questions.

- At the end of the Championship each group will present its results in the form of a written report (in Chinese) and a lecture of about 15 mn (also in Chinese) given before the jury. The jury will be composed of faculty members and some students. After that, the jury will select the winners.

- In order that people who cannot read Chinese may nevertheless be able to get an idea of what you have done, the following guidelines would help. (i) Write the romanized (i.e. pinyin) form of your names. (ii) Give your email addresses (iii) Give the English translation of the general title and of the titles of each section (iv) Give the English translation of the captions of all figures and tables (v) Also, in order to facilitate further discussion, it would be useful to number the pages of your report.

Contacts

As already said, this Championship should not be seen as a home work that you would do on your side. On the contrary, we wish to encourage broad discussions (i) between group members, (ii) between the participants and the organizers and also perhaps (iii) between the participants and their professors.

Please, give us a day and time for visiting us at Beijing Normal University. You can choose any time that is convenient for your group (from 8:30 in the morning until 23:00). If you cannot visit BNU, no problem, for we can have a discussion by phone.

As one of the organizers (namely B.R.) unfortunately is not able to read Chinese, discussing with you will be the only way for him to learn about your plans, goals and achievements.

If you are not comfortable in English, don't worry, language should not be an obstacle for you can very well speak in Chinese with Prof. Chen.

Schedule

The Championship will close around 20 November 2016 with the award ceremony. You will find the precise timing with all important meeting (dates and where they take place) in the Chinese version of this presentation. If you have some additional questions you can also contact Prof. Qinghua Chen.

(1) AGE DEPENDENT INFANT MORTALITY of PLANTS

Rationale of this investigation

Systems science is really successful when the *colorblue same mechanism* can describe *different kinds of systems*. In physics a well known illustration is the mechanism of gravitation. Together with Newton's law it can explain the behavior of a broad variety of systems; one can mention the fall of an apple, the movement of the Moon around the Earth, the movement of the Earth around the Sun, the phenomenon of the tides, the movement of our galaxy around its center and many others.

In this topic and in the next one, we wish to see if the pattern of human infant death rates can also describe infant death in plants or in fruit flies. For the moment this is just a conjecture. However, there are two good reasons supporting this conjecture.

- The first reason is that the start of life is similar in most living organisms. At the beginning there is a tiny embryo which needs a source of food and oxygen in order to grow. The names of this source of energy may differ but its function is always the same. In mammals, the energy is transferred in the form of blood from the mother to the embryo through the umbilical cord; in plants the source of food is called endosperm or cotyledon and it consists in starch. In birds or fish the embryo is contained in an egg which has the same structure as a seed. In this case the source of food is what we call yolk.

- The second reason is more compelling. By using available data for mammals and fish it was indeed possible to show that for these organisms the infant death rate pattern is the same as for humans (shown in Fig. 1a).

Definition of death

The main difficulty is how to define the death of a plant. Of course, when a plant becomes completely yellow and dry (for instance through lack of water) it is obvious that it is dead. Yet, even in this case, the roots may still be alive (this is called "seedling die back"). Moreover in ordinary temperature and humidity conditions it may take about two weeks for a plant which was initially green to become yellow or brown. Such an uncertainty is much too long. In addition, we are particularly interested in the early development because it is in this phase that the death rate is expected to be highest. However, in this phase, the plant has neither stem nor leaves which means that the criterion based on color cannot be used anyway.

A possible criterion for the death of a plant is the fact that it stops growing. In principle, the development of a plant goes through a number of well defined steps; if suddenly the development stops in a given stage, it seems possible to say that the plant has died at an age which corresponds to this stage. In principle, this definition seems to solve the problem but in practice there are a number of difficulties in its

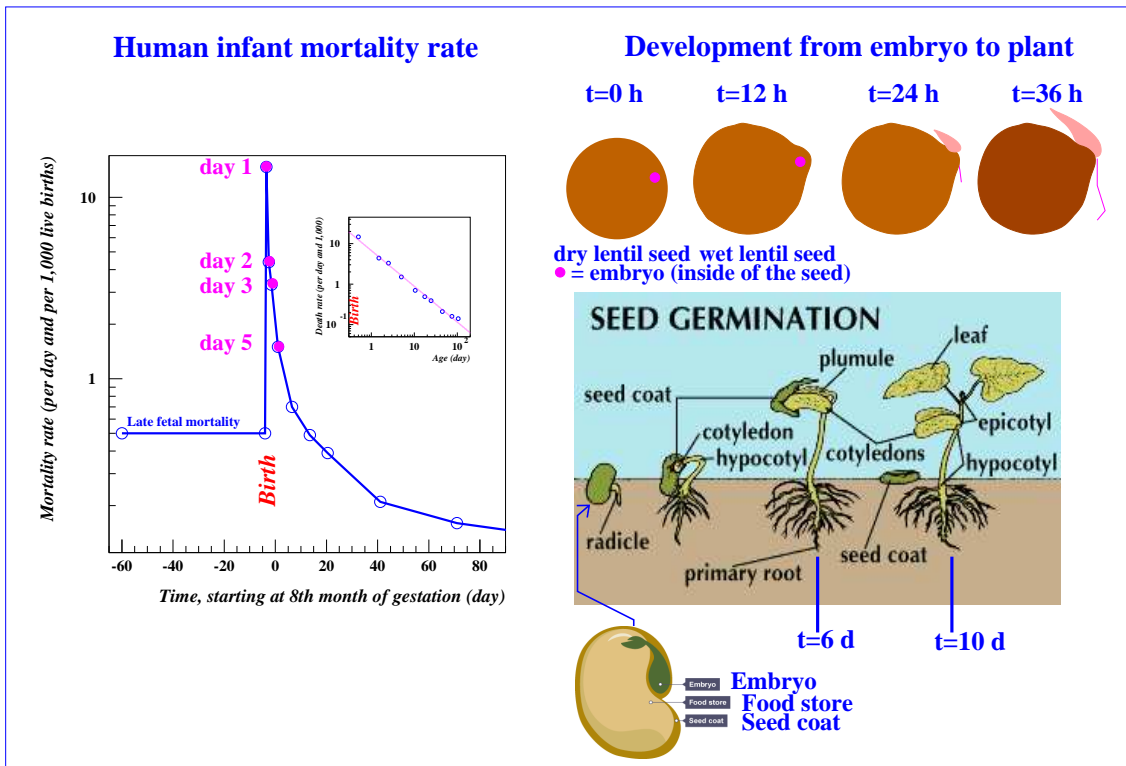


Fig. 1a,b. The infant mortality data are for the United States in 1923; the insert shows the same data in log-log plot; the hyperbolic shape of the decrease is the same nowadays despite the huge fall in overall infant mortality. The picture on the right-hand side shows the first steps in the development of plants. *Source: Linder and Grove (1947, p. 574-575).*

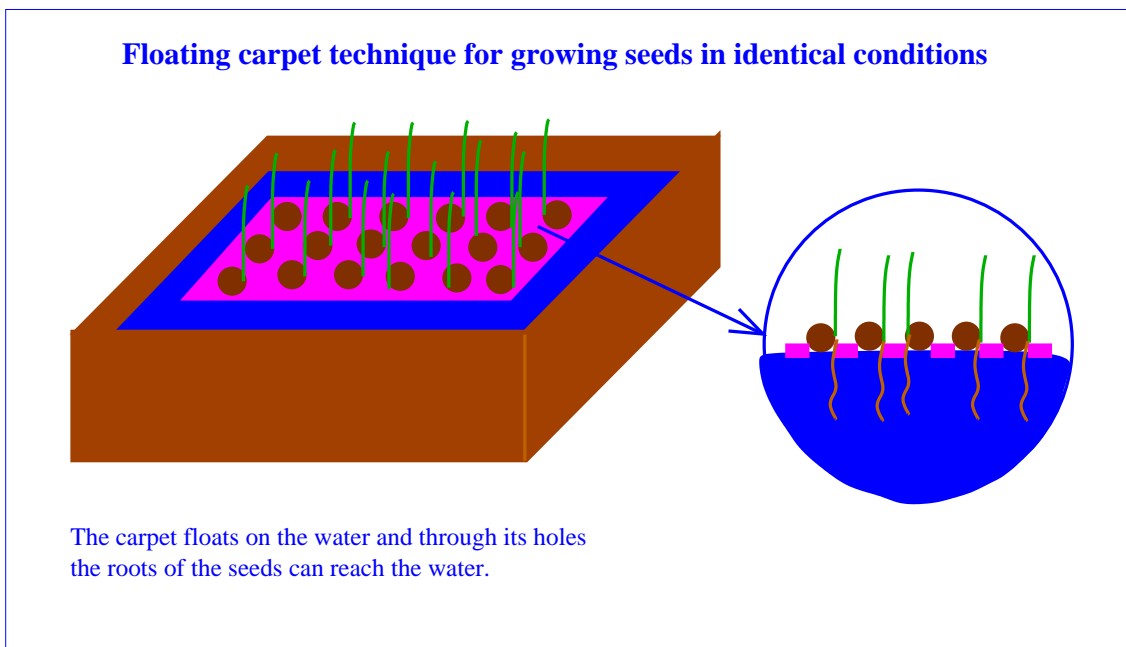


Fig. 2: A method for the germination of seeds. This kind of rubber-foam carpet with holes can be bought in stores selling things for kitchen and household. It is certainly available at the Five-Star market.

implementation.

The main problem comes from the fact that 1000 seeds will not develop in sync. In

their germination as well as in subsequent steps there will be notable time lags. For wheat or lentils these time lags can reach up to 14 days. In other species, they may be even longer.

Experiment A convenient seed is wheat, but if you wish you can of course also choose another plant. The main requirement is that it germinates quickly.

After elimination of the seeds which have developed without problem, you can collect those which did not fully develop. Among these, you will eliminate the seeds which did not germinate and then you will try to estimate the age of the seeds whose development has been stopped.

The final objective is to draw the curve of the number of deaths in each age group.

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(2) AGE DEPENDENT INFANT MORTALITY of DROSOPHILA LARVAE

Rationale of this investigation

This is a typical systems science investigation in the sense that we wish to see whether a pattern observed in a class of systems (namely mammals) also extends to other classes of living organisms. Here we study the case of *Drosophila* larvae because these organisms are commonly available in biological laboratories.

In the title there are two expressions which require explanations, namely “infant mortality” and “Drosophila larvae”.

The *Drosophilas* are fruit flies about 3mm in length that one can for instance see growing on bananas after leaving them outside in warm and humid weather. In this project we will not use the flies themselves but rather their larvae in the stage which precedes the pupa and fly stages. The larvae are little worms whose size increases from about 0.8mm immediately after emerging from the eggs to about 2.5mm in the last larval stage (L3 in Fig. 1a).

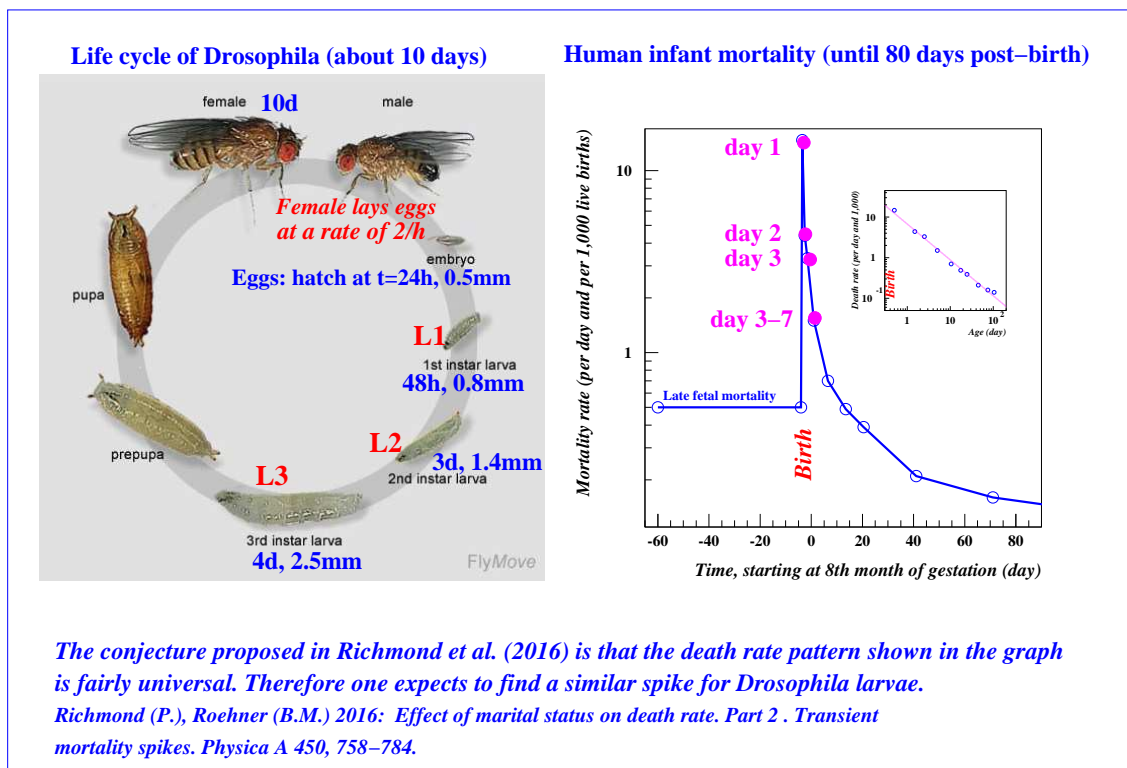


Fig. 1a,b. The letter h means hour and d means day. *Drosophila* females lay eggs at a rate of 2 to 3 per hour. The infant mortality data are for the United States in 1923; the insert shows the same data in a log-log plot; the hyperbolic shape of the decrease is the same nowadays despite the huge fall in overall infant mortality. *Source: Linder and Grove (1947, p. 574-575).*

The expression “infant mortality” is used in various contexts. In medicine it means the first year after birth. In reliability studies, infant mortality refers to the failure

rate of technical devices (for instance hard drives or lamp bulbs) in an early phase after being put in operation.

For new born babies the death rate, μ , as a function of age (also commonly referred to as the *age-specific death rate*) is known with high accuracy and it has a very special shape: it decreases as an hyperbola that is to say $\mu \sim 1/t$ where t denotes the age. Because the early steps of life, from the first cell of the embryo to the time following birth, are fairly similar across many species, it is reasonable to assume that all these living systems share the same infant death rate pattern. So far, this conjecture has been successfully tested for a number of species for which data were already available: monkeys, pigs, lambs, fish (Berrut et al. 2016).

It is interesting to remark that the pattern shown in Fig. 1b has remained unchanged during the past century despite a rapid fall in infant mortality. Thus, although rates fell, the hyperbolic shape remained almost the same. This invariance suggests that the hyperbolic pattern is a fairly robust characteristic.

Measurement of the age-specific death rate of *Drosophila* larvae

For humans, in spite of very low infant death rates one is able to draw precise curves with respect to age because in any large country there are millions of births every year. For *Drosophila* larvae we do not yet know the overall death rate but from some (fairly imprecise) indications found in the literature one expects rates of the order of a few percent per day. This is much more than human rates (which are of the order of 0.001% per day), nevertheless it shows that in order to get significant results one needs large numbers of eggs, basically of the order of several hundreds in each experiment.

Therefore the first challenge is to set up a production process which will produce enough eggs. A possible procedure is summarized in Fig. 2.

The second challenge is to identify the dead larvae. For that purpose we propose three different methods which are summarized in Fig. 2. We do not yet know which method is the best. As a matter of fact, we expect that two or three different methods can be tried. If they give fairly consistent results that will show that our measurement methods are indeed reliable.

Once a procedure has been used successfully for L1 larvae, it will be possible to repeat it for L2 and L3 larvae.

Using colored larvae.

The L1 larvae have a length of about 0.8mm which in principle should make them visible but as they are almost transparent they may be difficult to distinguish on the agar background. What makes this problem particularly serious is the fact that the surface of the agar will become uneven through the trails and tunnels left by the

Suggested procedures for measuring the age-specific mortality rate of *Drosophila* larvae

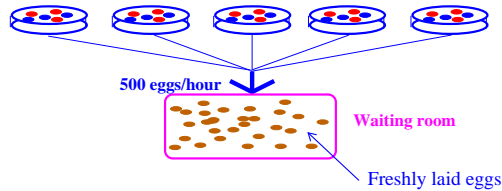
We will propose several methods.

However the first step, namely the production of eggs, is common to all of them.

(A) Production of eggs

In the development of a larva there are 3 main events (i) Fecundation of the embryo by the male. (ii) Laying of the egg by the female. (iii) Hatching of the egg.

In the production of the eggs the objective is to get a large number of eggs whose laying time is well defined. Several Petri dishes or test tubes will be used which contain enough males and females to get 100 eggs/hour in each. Thus, altogether, one will get 500 eggs all laid within one hour.



(B1) Method 1: Taking pictures

This is probably the simplest method. It consists in taking pictures for instance every 10mn.

The larvae which do not move are declared dead. As the time of the picture is known the ages of the dead larvae are easy to determine.

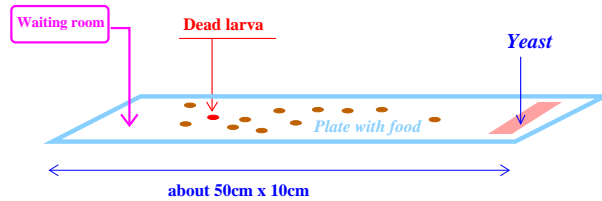
The main difficulty is to get enough contrast to make the identification of the dead unambiguous.

(B2) Method 2: Separating the dead from the living

This method is similar to the first, except that in addition one tries to separate the dead from the living in order to facilitate identification.

The separation may be obtained by attracting the living into one direction for instance by offering them yeast which they like very much and which has a strong smell.

Another way is to use the fact that, according to the Internet, the larvae prefer darkness to bright light.



(B3) Method 3: Each and every single larva in a separate box

This method is motivated by the fact that when hundreds of larvae move on a layer of agar, its surface becomes chaotic to the point of making observation almost impossible. The obvious solution is to give a separate box to each single egg.

The task of putting 500 eggs into 500 little boxes (about 30mmx30mmx10mm) can be done within about 1 hour by a team of 3-4 skilled persons.

Then, one only needs to monitor the boxes (for instance every hour) in order to identify the larvae which have died.

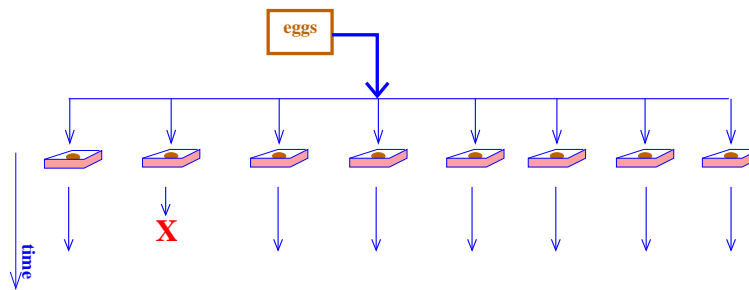


Fig. 2: Schematic summary of possible procedures for measuring the death rate as a function of age.

larvae. In addition, the larvae tend to burrow into the food which makes them even more difficult to see. Clearly, the task of identifying dead larvae would be much

easier if it would be possible to color them in green or red. This would also allow an automatic identification procedure to be used.

It turns out that some strains of larvae have been equipped with an additional gene (taken from jellyfish) which produces a protein that is fluorescent under an appropriate light. Alternatively, one could also try to color the larvae with a (harmless) dye, e.g. the kind of dye used for coloring pastries. However, the first method is certainly better for in in the second, after a while, the larvae become of the same color as the dye.

If the experiment is successful it should give rise to a nice paper whose co-authors would also include our colleagues of the School of Life Science.

References

Berrut (S.), Pouillard (V.), Richmond (P.), Roehner (B.M.) 2016: Deciphering infant mortality.

Physica A 463, 400-426.

Also available on the arXiv website at the following address:

<http://arxiv.org/abs/1603.04007>

Linder (F.E.), Grove (R.D.) 1947: Vital statistics rates in the United States, 1900-1940. United States Printing Office, Washington DC.

Richmond (P.), Roehner (B.M.) 2016: Effect of marital status on death rates. Part II: Transient mortality spikes. Physica A 768-784.

Also available on the arXiv website at the following address:

<http://lanl.arxiv.org/abs/1508.04944>.

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(3) AGE DEPENDENT INFANT MORTALITY in CHINA

Please, do not select this topic before you have been able to find the data that you need either on the Internet or in paper documents.

The statistics that you need are the following:

- 1 Number of deaths of newborns as a function of their age in months from 1 to 12 months for each province of China.
- 2 If in addition you can find data for the number of deaths per week (at least for the first months) that would be even better although not strictly necessary.

The first task is to draw the log-log plot of the death numbers as a function of the month (or of the week). Based on what was observed elsewhere, this should be more or less a straight line. So, you can compute the corresponding slopes for each province.

Then comes an interesting question. These slopes will not be all the same. Can we predict each of them from a specific characteristic of each province?

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(4) GIVING FOREIGNERS an UNDERSTANDING of SPOKEN CHINESE

This project proposes an innovative method for teaching Chinese to foreign visitors. More specifically we consider the case of visitors who stay in China for a few months every year. This is for instance the case of scientists who work during a few weeks or months in Chinese universities and research institutes. At the present moment, their number is still limited but it will certainly increase in the coming decades. For the purpose of a better integration, it is important to help them get a smattering of Chinese. The objective is to find a method which is both effective and nevertheless does not require too much time and effort on the part of the visitors. The key-idea is to help visitors to get some understanding of the Chinese sentences that they hear in their everyday activities (subway, TV, seminars, lunch or dinner with colleagues and so on).

How do Chinese children start to learn Chinese? The answer is simple. First of all, for almost two years, they listen to what the persons around them are saying. Of course, they will not understand everything, but little by little, they will understand the words which are used most often or those which are of special interest to them (e.g. cookies or toys). In other words, before starting to speak, children practice Chinese with their ears.

The method outlined below follows the same logic. Its goal is to help visitors to understand a growing number of the words that they hear in their everyday life.

Why understanding should come first

In learning a language one can distinguish 4 capacities: (i) to understand (ii) to speak (iii) to read (iv) to write. Naturally, in each of these capacities there are different degrees. Obviously, for visitors Chinese is a difficult language. In order to read or write they would need to know many characters. Even if some visitors are able to learn a number of characters it is likely that they will forget most of them once back home and no longer able to practice. Even to speak is a difficult challenge because the pronunciation of some words (for instance the Chinese words for “good morning”) require sounds which do not exist in western languages. In addition, there is of course the subtle question of the tones.

For all these reasons, understanding should come first. Even partial understanding makes children more and more integrated into their families; in the same way the ability to capture a few words at lunch or dinner will allow visitors to take part (in English of course) in the discussions instead of remaining isolated.

The principle of the method proposed in this project is as follows.

- One records words (and, may be, very simple sentences) that visitors have the opportunity to hear fairly often,

- One writes their transcription (more on this below),
- One explains each word in detail.

What messages do visitors hear repeatedly?

Here we list a number of messages and words that are often repeated.

- When visitors take the subway or the bus, they will hear the same message at each stop. Although, this message is also repeated in English, this is not enough to really understand the Chinese message word by word. So, it would be useful to record such messages and to explain them word by word. Incidentally, if there is too much noise in the subway, it is perhaps better to write down the message and to record it in a noiseless environment.



Fig. 1: News programs on CCTV4, i.e. China Central Television, channel 4

- In the news on Chinese TV channels (for instance CCTV 4) there are some words that are used fairly often. In order to identify the 20 most frequent words you should record the news over several days and then count the occurrences. These 20 words will provide at least an inkling of what is going on.

- In the discussions between colleagues there are some words that are used fairly often. Perhaps the most frequent are the Chinese words for “this” and “that” which give a kind of waiting time for what one will say next. Although used frequently, such words are rarely mentioned in language methods. Apart from “this” and “that” there may be some similar words of spoken Chinese; do not hesitate to include them.

- For longer discussions such as at lunch or dinner you can identify a number of commonly used words by recording the discussions over several days and then counting the occurrences.

- The same job can be done for scientific seminars. Here too there are certainly words that it would be helpful to know (e.g. the Chinese words for model, network, experiment, paper). In a sound track you can add (by computer) a “click” after the word that you wish to explain. In this way, the listener will be able extract the word from a longer sentence.

We have given several examples of situations but if you can think of others do not hesitate to include them.

What transcription is the most convenient?

The pinyin transcription is of course widely used but it is not the most convenient. Let us explain this with an example. The Shandong city which has many breweries was called “Tsing Tao” (green island); for a French or English speaking person, this was much easier than Qingdao. Indeed, you should remember that in English or French the letter “q” is always followed by the letter “u” which means that “qi” does not exist. and that in order to pronounce “Qingdao” correctly, western people must be used to pinyin pronunciation. This difficulty has been recognized and has led the authors of Chinese language methods to add a transcription which is adapted to French or English people. If you wish to follow this example we can give you a booklet with a method which uses this transcription.

This innovative language method should comprise an audio part (on a CD or USB key) and a written part. It is up to you to organize each part according to your ideas. In order to test it, you should send it to foreign researchers with whom the SSS is in contact, who are visiting BNU frequently and are willing to test the method. B.R. is of course eager to test it.

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(5) BLATANT DISREGARD for OCCUPATIONAL RISKS

People are often asked to work in conditions which put their health at risk. It is true that sometimes the risks are not well known and documented and therefore difficult to assess. However, there are also plenty of cases where the risks are well documented but ignored by managers. It is in this second class of cases that we are interested in this study. It turns out that the successive stages in such scandals follow a common pattern: first the risks are denied, then they are minimized, finally, when the scientific evidence becomes overwhelming, the compensation offered to the victims is delayed as long as possible so that eventually only a small number of survivors will get something.

First, as an introduction, we describe the case of the recovery workers after the attack of 9/11.

The facts

The twin towers of the World Trade Center (WTC) collapsed on 11 September 2001. The dust from the towers was known to be very toxic by specialists because it contained many chemicals (including lead and mercury which affect the nervous system) and also cancer-causing agents such as asbestos that coated the lower columns of the WTC. Nevertheless, thousands of recovery workers were asked to work there without appropriate protective filter masks (see Fig. 1a,b). Immediately after the attack police officers were sent there without any protective gear. Some rescue teams were provided with paper masks that became clogged within seconds.



Fig. 1a,b,c: Protection against dust. 1a: Police officers covered with dust near Ground Zero and without any protective mask. 1b: Fireworkers with inappropriate paper masks. 1c: Appropriate equipment against dust.

The truth denial started immediately after 9/11.

On 13 September 2001 a common press release of the “US Environment Protection Agency” (EPA) and of the “Occupational Safety and Health Administration” (OSHA) said: “Monitoring and sampling conducted on Tuesday and Wednesday [11 and 12 Sep.] have been very reassuring about potential exposure of rescue crews to environment contaminants. Sampling of both ambient air quality and dust particles was conducted Wednesday night in lower Manhattan and results were uniformly

acceptable. We are working closely with rescue crews to ensure that all appropriate precautions are taken. EPA and OSHA will work closely with cleanup crews to minimize their potential exposure”.

(Mattei 2004, Website of the EPA <https://yosemite.epa.gov>, see also the film made by Dehncke-Fisher 2006). On 14 September 2001 an article published in the “New York Times” summarized the situation with the following title: “Monitors say health risk from smoke is very small”.

In fact, 70% of emergency service workers have been diagnosed with serious respiratory problems as a result of their involvement with Ground Zero (Mount Sinai study of 2006, cited in Haynes 2010). The WTC Health Registry estimates that about 410,000 people were exposed to a host of toxins including asbestos. Between 2001 and 2009 the “New York City Department of Health” has recorded 817 deaths of WTC responders from illnesses generated by working on the site (Haynes 2010). Just in the “New York Police Department” (NYPD), from 2003 to 2015, 109 officers have died from illnesses officially attributed to “inhaling toxic materials in the rescue efforts at the WTC site” (<http://www.msnbc.com>).

In accounts of the events of 9/11 the workers who cleaned Ground Zero were praised as being heroes but the question of whether they should have been equipped with appropriate filter masks is never raised.

The cover up phase

Once the evidence about illnesses has become overwhelming comes the cover up phase. This means that although the authorities seem to recognize that there is a problem they try to belittle it as much as possible. This is done in subtle ways. Basically the method is to study very seriously an aspect of the tragedy where one knows in advance the evidence to be fairly weak. One must also remember that the first rule of a successful public relations campaign is that the message must come from a third party. In the present case the third party was a team of medical doctors who published an article in a renowned British scientific journal called “The Lancet” (Jordan et al. 2011). This study showed that firefighters who worked at ground zero were 19% more likely to develop cancer than firefighters who did not. 19% is a very small difference which seems completely inconsistent with the figure of 70% of the persons affected by some form of illness. Naturally, this result was cited on all official or semi-official websites. In itself this figure of 19% is certainly not wrong but it is biased in many smart ways by the very choice of the indicator.

- Why did the authors study the firefighters rather than the police or other workers? Surprisingly, the word “mask” does not appear in the paper which means that the authors do not tell us whether or not the fireworkers were wearing masks which is

of course an essential aspect of the question. Of all persons working on Ground Zero firefighters had certainly access to the best respiratory equipment. On the contrary, police or medical personnel had little access to such equipment.

- Why did the authors study cancer rather than respiratory diseases, for instance asthma which affected almost all persons exposed to the dust? Moreover, even if we accept their selection of cancer, why did they not focus on forms of cancer that are in relation with dust (lungs, throat). To study *all* cancers was of course a way to “dilute” the effect.

- Although the paper was published in 2011, its data cover only 2001-2007. It is well known that cancer takes several years to develop; seven years may be just too short. In addition, when one reads the paper one finds that the real difference was not 19% but 32%; 19% is what one gets after applying some (not well specified) “corrections”.

This public relations campaign was quite successful. It convinced the public that the problem was not too serious and that the authorities are taking care. In fact, in the article by Haynes (2010) one reads that several health insurance companies refused to cover the illnesses of volunteer workers. It is true that special aid programs were set up by the authorities but some 62% of the claims have been rejected.

Studies of similar cases: asbestos, Rely tampon affair, Memagon scandal

We suggest that you carry out the same kind of research as outlined above for 9/11 for some of the cases mentioned in the title.

First you will explain the facts and then the cover up campaigns. Be aware that, due to the misrepresentation campaigns, in order to identify the facts correctly one must be very careful in collecting data. This was illustrated above by the article in the “Lancet”.

The cases cited in the title are old enough for the truth to have emerged. A keyword search (with the English words) will lead you quickly to articles which give a summary of these cases. Then, a second step will be to provide more details about the cover up. This will be your main task.

In more recent cases (such as genetically modified organisms, GMO) the facts themselves are not yet well known as they are still hotly disputed between scientists. The fact that some scientists are bribed by the companies which produce the GMO does not help to clarify the dispute.

References

Dehncke-Fisher (H.) 2006: Dust to Dust: The Health Effects of 9/11. Documentary film available on Internet.

Haynes (L.) 2010: 9/11's forgotten victims: "We are living in a toxic time bomb".
Mail on Line, 3 September 2010.

Jordan (H.T.) et al. [12 authors] 2011: Mortality among survivors of the Sept 11, 2001, World Trade Center disaster: results from the World Trade Center Health Registry cohort. *The Lancet*, Volume 378, Number 9794, p. 879-887.

[This paper illustrates the saying that the best way not to ignore something is to look for it in the wrong place.]

Mattei (S.) 2004: Pollution and deception at Ground Zero. How the Bush Administration's reckless disregard of 9/11 toxic hazards poses long-term threats for New York City and the nation. *Sierra Club*. New York.

[Subsequent development of diseases confirmed this early assessment.]

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(6) CORRUPTION IN WESTERN COUNTRIES: INSTITUTIONAL CORRUPTION

Broadly speaking one can distinguish two forms of corruption: (i) Institutionalized corruption of which lobbying is the most common form. (ii) Covert corruption. In contrast to the second, the first is not seen as illegal. Thus we have better information about the first than about the second and that is why the two forms are studied separately in two different projects.

Lobbying and the power of greed

Margaret Thatcher

Do you remember who was Margaret Thatcher?

She was the Prime Minister of the United Kingdom from 1979 to 1990. She was also an ardent proponent of neoliberal policies. The Wikipedia article about her tells us that “during her time in office, Thatcher practiced great frugality in her official residence, including insisting on paying for her own ironing-board.

However, as soon as she left office, she accepted to work as a “geopolitical consultant” for the tobacco company Philip Morris at a salary of \$250,000 per year and extra payments of \$50,000 for each speech she delivered. In that capacity, her role was to help promote smoking worldwide and especially in developing countries. For instance, in an internal Philip Morris memo (Petticrew et al. 2014) one reads the following observation: “For some time now we have been struggling to find an appropriate way to enter China in tobacco. Does she [Thatcher] have any views about that?” We do not know how she helped but one can be sure that she did her best. The same memo tells us that “in the European Union she was quite helpful in developing lobbying strategies”.

Now, what is lobbying if not a form of corruption. In many countries the big amounts of money that Margaret Thatcher received would be called bribes for indeed she used the reputation attached to her former official position in order to make money in fairly inappropriate ways. Article 5.3 of the “Convention on Tobacco Control” of the “World Health Organization” states that public health policies should be free from tobacco industry interference. Nonetheless, Margaret Thatcher continued to work for Philip Morris until 1997 and nowadays this important episode of her life is rarely mentioned in her biography.

Tony Blair

What Margaret Thatcher did on a fairly small scale, Tony Blair has done on a much larger scale. Like Margaret Thatcher he was Prime Minister of Britain for about 10 years, from 1997 to 2007. In contrast with Ms. Thatcher, Mr. Blair accepted an

official position after leaving his position as Prime Minister. He became the envoy (i.e. a kind of ambassador) of the so-called Quartet (i.e. the US, the European Union, the United Nations and Russia) for peace discussions in the Middle East. However, at the same time he created a company named “Tony Blair Associates” which is offering consulting services to banks (e.g. JP Morgan), Governments (e.g. Kuwait) or companies (e.g. Qatari Telecom QTEL). For instance, TBA was paid 27 million pounds by Kuwait. In spite of glaring conflicts of interest denounced by many medias, Blair was allowed to keep his official position for 8 years, from 2007 to May 2015.

Questions

- Please, take a close look at the Petticrew et al. paper. Extract the most significant parts; you can also read some of the additional papers that are mentioned in the reference section. If you cannot download the paper from the Internet, a copy is available from Prof. Chen or Prof. Roehner

(e.g. <http://www.lpthe.jussieu.fr/~roehner/thatcher.pdf>)

- Can you find data for Philip Morris’ share in the Chinese tobacco market for the years 1990-2010? That would help us to measure the effectiveness of the views provided by Margaret Thatcher.

- Can you find other prominent politicians who have been doing lobbying work for private companies? Apart from tobacco, you can also consider the pharmaceutical, arm or alcohol sectors.

Widespread institutionalized corruption

Everybody would probably agree that students who pay their teachers in order to get good marks are exercising a form of corruption. Needless to say, those teachers would also be called corrupt. As a matter of fact their behavior corresponds exactly to the definition of corruption given in the “Longman Dictionary of Contemporary English”, namely: “improper use of one’s position to make money”.

Yet, if we think about it, we will quickly realize that this kind of situation and behavior is quite common in western societies; here are a few examples.

- *Rating agencies.* One of the main roles of rating agencies (such as Fitch or Standard and Poor’s) is to rate bonds issued by companies and set up by a bank. For instance, after “Goldman Sachs” has arranged a bond for “General Motors”, it will ask Fitch to rate this bond. Who will pay Fitch to do that? It is “Goldman Sachs”. So, we are exactly in the same situation as in our teacher-student example. Of course, what “Goldman Sachs” will pay will be covered by the fee that it will charge on GM for this financial services.

- *Pharmaceutical companies.* After a new drug has been discovered by a phar-

maceutical company its safety and effectiveness must be tested in clinical trials by a team of medical doctors and researchers. Who pays for these trials? As a rule, in most western countries, they are funded by the pharmaceutical companies themselves. Is this not again the situation of our teacher-student example.

- *Conflict of interest in scientific papers.* At the end of scientific articles, the authors are asked to list the funding they have received. Let us illustrate this by an example. The article by Anderson et al. (2016) has 32 coauthors. Of these about 10 are from Asian hospitals and universities in China, Singapore and Vietnam. Of the remaining 22 western researchers 12 declare having received extra perks (e.g. lecture fees, consulting fees, fees for serving on advisory boards or monitoring committees); among these, 6 have received such extra-payments from the pharmaceutical company “Boehringer Ingelheim” who sells the drug named alteplase (sold under the brand name “Actilyse”) which is investigated in this paper (see Fig. 1). So, we are once again in the same situation: researchers are paid by a company for evaluating a drug made by that very same company. Is this the best way to ensure an impartial evaluation?

Conflicts of interest of medical researchers a.k.a. corruption

Dr. Anderson reports receiving fees for serving on advisory boards from Medtronic and AstraZeneca and lecture fees and travel support from Takeda. Dr. Robinson reports receiving personal fees from Bayer, Boehringer Ingelheim, and Daiichi Sankyo. Dr. Lindley reports receiving fees for serving on a steering committee from Boehringer Ingelheim and lecture fees from Pfizer and Covidien. Dr. Lavados reports receiving grant support and personal fees from Bayer and AstraZeneca and travel support from Bayer and Boehringer Ingelheim. Dr. Broderick reports fees paid to his institution for serving on a steering committee from Genentech. Dr. Demchuk reports receiving fees for continuing medical education events from Medtronic. Dr. Bath reports receiving fees for serving on a data monitoring committee from ReNeuron, consulting fees from Athersys and Nestle, and lecture fees from Phagenesis. Dr. Donnan reports serving on advisory boards for AstraZeneca, Boehringer Ingelheim, Bristol-Myers Squibb, and Merck Sharp & Dohme. Dr. Ricci reports receiving travel support from Bayer and Boehringer Ingelheim. Dr. Roffe reports receiving support from Boehringer Ingelheim to organize a conference at her institution. Dr. Woodward reports receiving fees for serving on a data monitoring committee from Novartis and consulting fees from Amgen. Dr. Chalmers reports receiving lecture fees and grant support from Servier. No other potential conflict of interest relevant to this article was reported.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

Fig. 1: An example of conflict of interest in medical research. “Alteplase”, the drug that was tested in the paper under consideration, is sold by the pharmaceutical group “Boehringer Ingelheim” (underlined in red). The fact that 6 of the authors of this paper were paid by this company suggests that the expression “conflict of interest” is nothing but a polite word for institutionalized corruption. *Source: Anderson et al. 2016).*

In Fig. 1 we see several mentions of lecture fees. How high can lecture fee reach? One should make a distinction between different environments: lecture fees in academia (usually less than \$1,000), lecture fees paid by private companies for special events (never less than \$10,000) and fees paid to well-known political figures such as Tony Blair or Bill and Hillary Clinton (over \$200,000 per speech). How is it possible to say where corruption does start when such large amounts can be paid quite legally.

Questions

The two cases of institutionalized corruption that we mentioned raise many additional questions.

- Can you document more closely the case of rating agencies. What is the policy of the Chinese rating company named “Dagong”? On Wikipedia, we are told that “Dagong wusi” means “impartial and without prejudice”. This is indeed what would be expected from a rating agency.

- As an illustration of corruption in the pharmaceutical industry you can investigate the following episodes which both involve the “Johnson and Johnson” corporation (Wikipedia, article entitled “Antipsychotic”). In the US, the government has initiated legal action against the pharmaceutical company Johnson & Johnson for allegedly paying kickbacks to “Omnicare” to promote its antipsychotic “Risperdal” in nursing homes.

Harvard medical professor Joseph Biederman conducted research on bipolar disorder in children that led to an increase in such diagnoses. A 2008 Senate investigation found that Biederman received \$1.6 million in speaking and consulting fees between 2000 and 2007 from companies including makers of antipsychotic drugs prescribed for children with bipolar disorder. Johnson & Johnson gave more than \$700,000 to a research center that was headed by Biederman from 2002 to 2005, where research was conducted on “Risperdal”, the company’s antipsychotic drug.

A detailed article from the “New York Times” on this topic can be read on the website of the Championship.

- Can you find other situations of institutionalized corruption in western countries? As a hint, do you think that sport is free of corruption? Given the big amounts of money which are involved, that would be surprising. See the successive scandals in the attribution of the Olympic games.

References

Anderson (C.S.) et al. [32 co-authors] 2016: Low-dose versus standard-dose intravenous alteplase in acute ischemic stroke. *The New England Journal of Medicine* 374,24,2313-2323.

[The NEJM is one of the most reputed medical journals. “Alteplase” is the name of the drug. Note that an ischemic stroke occurs when an artery to the brain is

blocked by a blood clot. The purpose of the drug is to dissolve the clot.]

Morgan (N.) 2013: How much can you charge for speaking? Forbes, 14 November 2013.

Petticrew (M.), Krishnaratne (S.) 2014: The Fag Lady, revisited: Margaret Thatcher's efforts on behalf of the tobacco industry. Public Health, Volume 128, Issue 10, October 2014, Pages 904-910.

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(7) CORRUPTION IN WESTERN COUNTRIES: COVERT CORRUPTION

The discussion about “Institutionalized corruption” showed that it can be done very easily and without taking any risk. Have you ever heard that a medical doctor has been indicted for accepting bribes from a pharmaceutical company? Personally, I did not. Therefore, one may wonder why some persons get involved in covert corruption exposing themselves to being arrested, tried and sentenced. As a matter of fact, one of our main objectives is to discover the mechanism which leads to covert corruption.

Covert corruption

Covert corruption can only be identified when the corrupter and corrupted are tried and sentenced. Therefore the cases which come to be known may be only the tip of the iceberg. Nevertheless, numerous cases came to the attention of western citizens. Here we will limit ourselves to three illustrations but it will be easy to find many, many others through an Internet search.

The Lockheed bribery scandal

The “Lockheed bribery scandal” is one of the best known corruption scandals because of its international extension. The scandal was revealed in 1976 but the bribery practice itself had been going on for at least 20 years.



Fig. 1: Lockheed F-104 Starfighter Left: US Starfighter. Right: German Starfighters. The German Airforce lost 110 pilots in F-104 accidents which earned the aircraft the nicknames of “Flying coffin” and “Widow-maker”. The F-104 was also at the center of a bribery scandal. Lockheed had bribed many leaders in various nations in order to secure purchase contracts. The aircraft was sold to 14 US allies in Europe and in Asia (e.g. Japan, Jordan, Pakistan, Taiwan). *Source: Wikipedia article entitled “Lockheed F-104 Starfighter”.*

Lockheed is an American aircraft manufacturer. At that time it was building civilian as well as military aircraft. Nowadays, it builds only military aircraft. In 1976 it was revealed by an investigative committee of the US congress that Lockheed had paid (at least) \$22 million in bribes to foreign officials in Belgium, Germany, Japan,

Saudi Arabia to make them buy the F-104 Starfighter. However, as the United States did not wish to embarrass its allies, few persons were sentenced.

On account of what is said about the payment of fees in the topic about institutionalized corruption one may wonder why the money given to these officials was not labeled as being lecture or consulting fees. We do not really know. As already said it is one of the questions to be raised in this project. Tentatively, however, one can propose two sorts of explanations (i) At that time it was perhaps less common to pay lecture or consulting fees amounting millions of dollars (ii) A substantial fraction of this money was used to fund political parties. This second reason raises an important point developed in the next section.

Black money used for funding political parties

In most western countries (yet, for all intents and purposes, not in the United States) the funding of election campaigns is ruled by law. One of the main rules is that the amount that parties can spend is capped. There is an obvious reason for that which is easy to understand. Nowadays, promotion and advertisement campaigns on TV, newspapers or billboards have become fairly effective, but they are also very costly. Thus, if a political party can spend an unlimited amount on extensive promotion campaigns that will give it an unfair and inordinate advantage.

Thus, if a party can secure a covert source of funding, it will be able to set up a bigger promotion campaign than its contenders. The covert source of funding may be foreign money (which raises the problem of foreign interference) but it can also come from many other sources. In the next section we mention a corruption affair of that kind that occurred recently in France.

In France as in many other countries after an election each party must submit its accounts to a special committee which may approve them or not. For a presidential campaign the expenses are limited to 38 million euros per candidate for the two ballots. As a matter of comparison, in 2012 the Obama campaign had spent (at least) \$1,123 millions whereas his opponent had spent \$1,019 millions. These figures are 25 times higher than in France for a population that is only 5 times larger.

It turns out that the accounts of the presidential campaign of French president Nicolas Sarkozy were found to be fraudulent which led to Sarkozy being indicted for illegal funding of an electoral campaign. This was called the “Bygmalion” affair which is the name of a public relations company through which the black funding was organized. More information can be found in the Internet.

Questions

The first step would be to build up a mini-data base of corruption affairs. This can be

done easily by searching the key word “corruption” on the Internet or on the search engines of newspapers.

Be aware that in some cases, corruption was only one facet of the whole affair. For instance, the road racing cyclist Lance Armstrong won the “Tour de France” seven times but for much of his career faced persistent allegations of doping. He was not caught for many years because he made “gifts” to the “Union Cycliste Internationale” (UCI) and paid lobbying firms for the purpose of smearing and discrediting the team mates who testified against him. More information on this interesting case can be found on Wikipedia.

Once you have collected and summarized a whole set of cases, the second step is to see if they show possible patterns and rules.

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(8) ABSENTEE OWNERSHIP for COUNTRIES

Ireland is the archetype of absentee ownership in the sense that it is the country where this system took its most extreme form.



Fig. 1a,b: Tenants (left) versus landlord (right). The small script next to the word “Absentee” says: “Scene in Naples (Italy); enter the ghosts of starved Irish peasantry”. That is why the landlord looks terrified. *Source: The Looking Glass (1830). This was a satirical journal issued monthly between January 1830 and December 1832.*

- English landlords owned large estates which they rented to poor Irish tenants. In the 19th century the Gini index of land ownership was 0.93, a level rarely seen elsewhere in the world even in Latin America where the so-called *latifundia* system was somewhat similar. Most of them did not live in Ireland, but rather in England and in addition they spent much time in Italy or in the South of France (see Fig. 1b in this respect).

- This system strangled economic development to the point of leading to a chronic state of famine which lasted several decades. Between 1840 and 1900 the population fell from 8 to 4.5 millions. The most severe famine was between 1846 and 1850. The fact that throughout the entire famine period Ireland was exporting enormous quantities of food likened this situation to a kind of genocide (Wikipedia article entitled “Great famine”). Formally, Ireland was not a colony but a part of Great Britain and had its representatives in the British Parliament. Yet, whereas annual death rate data are available for England and Wales since 1840, for Ireland there are no annual data prior to 1916.

Although, as already said, Ireland was a province of Britain, there was a great divide between the landlords and their tenants which was due to religion (Anglican versus catholic), language (English versus Irish), social status (wealthy aristocracy versus landless peasants). In Roehner (2007) it is argued that a lack of interaction between

groups of citizens hampers economic development and leads to highly unequal societies.

In this project, we propose to test this conjecture on the three cases of Puerto Rico, the Philippines and Mexico.

- Puerto Rico is an island located near Cuba. Although it is part of the United States, it is not a state but has the status of a Territory. The upper class is wealthy and speaks English whereas the poorer class speaks mostly Spanish because Puerto Rico has been a Spanish colony for about three centuries.

Is there also a deep divide between the upper class and the rest of the population? In order to answer this question, you should first of all get a broad knowledge of the past history of Puerto Rico. You can use the book by Nelson Denis (a copy is available on the website of the Championship) and complement it with a Internet documents for the more recent period.

Since early July 2016, Puerto Rico is in a state of bankruptcy.

- Like Puerto Rico the Philippines had been a Spanish colony before it was taken over by the United States after the war of 1898 against Spain. Although it is formally a sovereign country it is very much under US influence. Another characteristic that it shares with Puerto Rico is the fact that a substantial fraction of the population is working abroad (particularly in the United States) because there are not enough domestic jobs available.

As measure of economic development you can use the growth of wages (if the wages are nominal wages do not forget to subtract the inflation rate)

- Mexico has several similarities with the Philippines: a rapidly growing population, strong links with the United States and with US corporations, powerful gangs of drug traffickers

You can again use the wage criterion to estimate real economic growth.

In Mexico and the Philippines there has been a great increase in the activity of gangs of drug dealers; is there something similar in Puerto Rico? How can one estimate the divide between the population and the political leaders?

Please, do not forget that this project should not become an exercise in comparative macroeconomics because we are more interested in social and political interactions than in economic data. Of course, macroeconomic data are easier to find than social data, but they give little real understanding.

References

Denis (N.A.) 2015: War against all Puerto Ricans. Nation Books, New York.

[A lively and well documented history of Puerto-Rico which covers the period 1898-1955.]

Roehner (B.M.) 2007: Driving forces in physical, biological, and socio-economic phenomena. A network science investigation of social bonds and interactions. Cambridge University Press, Cambridge (UK).
[Chapter 8 is entitled “The absentee ownership syndrome”.]

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(9) ABSENTEE OWNERSHIP for COMPANIES

The mechanism studied in this project is similar to the one for countries. However, it must be recognized that this study is more difficult for the simple reason that the history of countries is better documented than the history of companies. Thus, in this project the main challenge is to find appropriate sources.

“Absentee ownership” means that a company A has bought the stock of a company a_1 and therefore owns a_1 without having any expertise in the kind of operations conducted by a_1 . When the company A owns in this way many other companies it is called a holding company. A well-known illustration is provided by “Berkshire Hathaway”, the company owned by billionaire Warren Buffet. As of 2015 it owned 51 companies in a broad range of sectors: railroad, home furnishing, encyclopedia, manufacturers of vacuum cleaners, jewelry, 22 regional newspapers and several regional electric and gas utilities.

One of the main advantages of holdings is the fact that they can have a Russian doll structure in which a parent company AA controls the holding companies A, B each of which controls a set of companies a_1, a_2, \dots , and b_1, b_2, \dots . This allows AA to control a_1 with only one half of the capital that would be required for a direct control. The reason is easy to understand if one remembers that a company AA controls a company A if it owns $50\% + 1$ of its shares. Thus, if we assume that A owns $50\% + 1$ shares of a_1 , we see that AA will control a_1 through A with only 25% of the total shares.

However, such a multilevel hierarchical structure is probably not the best way to create an effective interaction between the workers of a_1 and the main owner of AA . Therefore one would expect that this structure may perhaps work for standard daily management but will be inappropriate if bold decisions must be taken in response to new challenges. A military analogy would be to observe that in time of peace a poor interaction between officers and soldiers will get almost unnoticed whereas in a war such an army will be quickly defeated.

In fact, it is often possible to be in control of a company with much less than 50% of its shares. It all depends upon the structure of the ownership. If you have 15% of the stock while the shares of all other stock holders are below 0.5%, then unless all other holders agree with one another, your voice is likely to prevail in any major decision concerning the company.

The purpose of the present project is to study the effects that ownership (even partial ownership) by a main share holder may have on the long term development of companies. For that study one needs to find good cases in the same way as Ireland, Puerto Rico, or the Philippines allowed us to extract the main features.

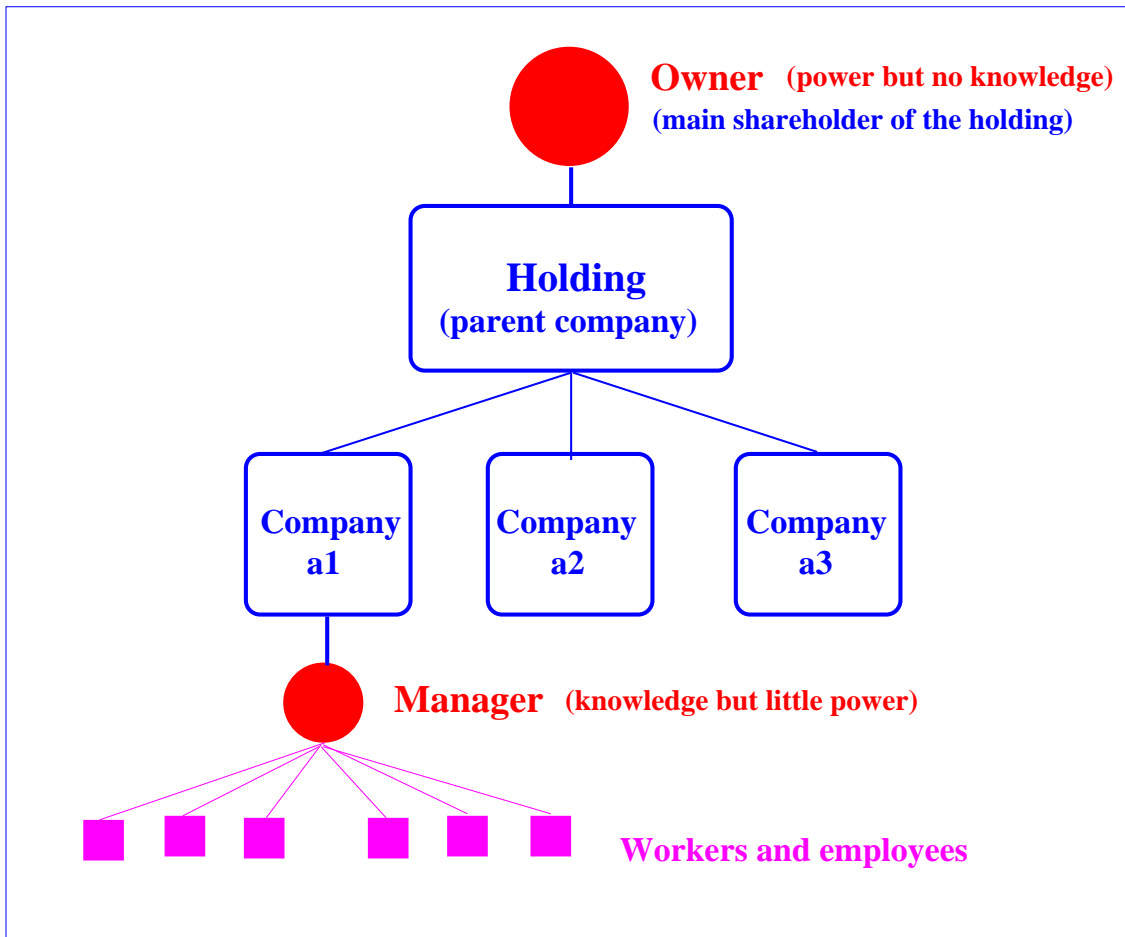


Fig. 1: Connection between the head of a holding company and the workers. For the sake of simplicity we have considered that the holding owns only three companies; in fact, holdings may own several dozen companies and may even own other holdings which then adds an additional layer to the structure shown in the Figure.

Just as an illustration, let us consider the case of Boeing Corporation. On the website <http://finance.yahoo.com> one can find the financial structure of Boeing. You should enter BA (Boeing's stock code) into the search window; then in the menu on the left-hand side of the screen one should select: OWNERSHIP, Major holders. Then, you will see that together the 5 top owners which are all financial companies have got 30% of the shares. If they agree with each other, this is enough to control Boeing's strategy. There is at least one objective on which they are likely to agree, namely to favor any decision which will boost the valuation of the shares that they hold. The obvious consequence will be that short-term maximization of net income (i.e. profit margin) will take precedence over long-term objectives. This leads immediately to the following question:

Did such a requirement have a visible effect on the strategy of Boeing? In other words, in past decades can one see an evolution in the strategy of Boeing which would reflect the growing weight of financial (as opposed to technical) objectives.

The conflict between short-term demands and long-term objectives should be partic-

ularly visible for companies whose products require a long development time. This is obviously the case of aerospace companies such as Boeing and that is why we suggested this example. Of course, you can also examine the case of other companies including Chinese companies. The main challenge is really to find good sources of information.

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(10) EXPLORING TWO EPISODES in the HISTORY of the KUOMINTANG: 1924, 1937

This project was designed for students who like historical inquiries. It may interest students from the history department but also students from other departments who wish to explore historical documents.

The present project focuses on two episodes which, although important, are not well known. The purpose is to find new information which will better explain what happened. Possible sources are Chinese newspapers which can be read at the National Library of China or other contemporary sources. The first episode occurred in 1924 in Guangzhou, the second in Shanghai and Nanjing in 1937.

As a starting point you can take two Wikipedia articles:

https://en.wikipedia.org/wiki/Canton_Merchant_Volunteers_Corps_Uprising

<https://en.wikipedia.org/wiki/Hanjian>

Below we briefly summarize what is known and what remains to be unraveled.

Canton merchants' uprising in October 1924



Fig. 1: Inauguration of the Whampoa Military Academy on 16 June 1924. Sun Yat-sen sitting and from left to right: He Yingqin, Chiang Kai-shek, Wang Boling. The Academy was opened on the suggestion and with the help of Komintern agents from the Soviet Union. We are told that on 15 October 1924 the Canton uprising was suppressed by students from the Whampoa Academy. One wonders how this was possible only 4 months after the Academy opened? How many cadets were admitted and how could they be trained in such a short time? *Source: Wikipedia article entitled “Académie de Huangpu” (in French); “Huangpu” is the name in Chinese while “Whampoa” is the name in Cantonese.*

As you know, the Kuomintang was established in August 1912 and Sun Yat-sen

was its first chairman. Sun, however, was located in Canton (now Guangzhou) and Canton was considered by the British as belonging to their zone of influence because it was only some 100 km north of their colony of Hong Kong. Therefore when Sun started to accept the support of Russia, they were not very happy. After 1917, Britain had sent troops to Russia to fight the Revolution and it did of course not welcome an extension of Russian influence in China. Thus, one would not be surprised to see Britain's hand in the failed attempt of the "Merchant Corps" to seize power.

However, before trying to find out what was the British role there is a factual question. The Wikipedia article says that "about 2,000 people had died". This is a large number for an uprising which lasted only one day and it raises a number of questions.

- What is the source for this number?
- What was the strength of the two sides?
- If the number of 2,000 correct, were the victims killed during the battle or executed after the uprising was defeated?
- Then you should have a look at the Times of London newspaper. This will be easy because there is a computerized version of this newspaper which is available in major libraries.

Arrests and executions of traitors in 1937

Chiang Kai-shek attributed the defeats of the Nationalist Army in battles against the Japanese to the action of traitors and ordered their arrest. The Wikipedia article tells us that 4,000 were arrested in Shanghai and 2,000 in Nanjing and that some of them "were executed swiftly".

One wants of course to know on what basis these persons were arrested and how many were executed. This information should be available in official Kuomintang documents.

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(11) EXPLANATION of the ERROR MESSAGES GENERATED by PROGRAMMING LANGUAGES

Important

This project is destined to students who are used to the LINUX operating system, who know the “bash” programming language (which is closely connected with LINUX) and who know also a programming language such as C, Python or Fortran. The guidelines given below would not work with the Windows-Microsoft operating system.

Why is it important to make error messages more friendly?

There are two possible conceptions of programming:

1 In the narrow conception programming is done only by professional programmers.

2 In a broader conception, it is recognized that programming is a tool which can be useful for many activities. A musician may wish to write a script in Python which will generate some special sound sequences. A historian may need to write a program in Java which will serve him as a personal search engine through which he will be able to retrieve the sources that he needs. One could give many other examples.

A parallel with music may help to make this distinction clearer. In the narrow conception of music, there would be only professional musicians whereas in the broad conception many people will learn to play music in order to play with friends or just for their own pleasure.

In the United States, it is the broad conception of programming which has been adopted whereas in Europe it is the narrow conception which prevails. The clear result is that decades after decades Europe has fallen behind. Nowadays, it is hardly an exaggeration to say that almost all software tools used in Europe have been created in the United States.

Which path will China wish to follow? This is an important question whose answer is not yet clear. If China wishes to follow the European path, then one does not need to care about making error messages more friendly. On the contrary, if China wishes to adopt the broad conception it is crucial to present programming (and more generally all facets of computer science) in a congenial and friendly way.

Most professors who have been teaching programming have observed that understanding the error messages generated by compilers is a great obstacle for most students, an obstacle that many students are never able to overcome. Thus, throughout their life they will remember programming as something that is difficult and recondite. The clear result is that they will never be tempted to use programming in their

own activity. On the contrary, if one can make error messages user-friendly, even students who do not plan to become professional programmers will keep a recollection of programming as being something fun, amusing and useful (just like music!) Whenever needed, they will not hesitate to devote some time to learning a programming language that can help them.

How to make error messages more user-friendly

In order to make error messages more user-friendly the first step is of course to translate them from English into Chinese. You may object that the codes of almost all programming languages use English words. However there is a great difference between the code and the error messages. The code uses only a limited number of words which are easy to learn, whereas in the error messages there are English sentences with many, many English words.

What makes things worse is the fact that the words that they use are not at all the kind of words that one studies in English classes. As an example, consider the following error message: *Unary operator expected*. Of these 3 words, only “expected” is standard English. “Operator” is not uncommon but it is a mathematical term not learned in English classes. “Unary” is a very uncommon word which may not be known even by native English speakers.

Using again our previous analogy with music it would mean that before starting to play music one must first learn to speak English. There is little doubt that this would add an additional difficulty.

Translation and explanation

In this project, we wish to translate automatically the English words of the error messages of any programming language into Chinese and also to explain the words which are not easy to understand. One of the main tasks will be to build a dictionary which will contain translations and explanations of the words used in error messages.

If you are interested in this project, be careful to include into your team one or two persons who do *not* know programming. Indeed, the only real way to test if your translations and explanations are good and appropriate is to see if other students can understand them. Remember that it is not because you understand an explanation written by yourself that other persons will understand it quite as well.

More detailed explanations and code written in bash can be found in Roehner (2015).

References

Roehner (B.) 2015: Translation into any natural language of the error messages generated by any computer program.

Available on the arXiv website at: <http://arxiv.org/abs/1508.04936>

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