Part III

Micro-interactions:
a network explanation of suicide

The statistical investigation of the phenomenon of suicide began in the mid-nineteenth century when data about suicide rates became available in all industrialized countries. Emile Durkheim's book about suicide which appeared in 1897 was a landmark in this research but there had been many earlier studies[1]. The contribution of Durkheim stands out because he proposed a social interpretation of suicide rather than one based on individual, psychological factors. He maintained that one of the main factors of suicide is social isolation. According to this view it is the paucity of the links and interactions with other people which leads to suicide. This perspective is similar to the interpretation of apoptosis according to which cell death occurs when the cells no longer receive the "stay alive" message from their neighbors (see the chapter on apoptosis).

Yet, to this day, the phenomenon of suicide remains fairly mysterious. Common sense seems to be misleading rather than helpful as illustrated by the two following observations. (i) Contrary to the assumption or expectation of many people, the monthly maximum of suicide rates does not occur in fall or in winter time but in May or June. (ii) Even events as dramatic as the attack of September 11, 2001 have no visible impact on the number of suicides. This observation which will be explained in more detail in a subsequent chapter holds at monthly as well as at daily level. In other words, (i) the number of suicides in the United States in September 2001 is not different from the numbers observed in September 2000 or September 2002, and (ii) the daily numbers of suicide in September 11, 12 or 13 are very similar to the other daily numbers of September 2001.

Many empirical regularities have been suggested and studied but in fact very few of them have a broad validity in time and space. Let us give some examples of rules which were at first thought to hold until they were invalidated by exceptions and anomalies.

- **Impact of economic recessions** It is often claimed that suicide rates rise in times of economic recessions, but there are in fact many exceptions. Overall the correlation between suicide and unemployment is fairly low. For instance, in Germany over the time interval 1881-1989, it is equal to 0.19. If one makes a distinction between males and females, the picture becomes even more confusing: it appears that over 1949-1989, the suicide rate of males is positively (but weakly) related to suicide, $r = 0.26$, whereas the correlation is negative (and even weaker) for females, $r = -0.16$ (Weyerer and Wiedenmann 1995).
- **Male versus female suicide rates** In Western countries the suicide rate of males is about twice the suicide rate of females. Yet, in China and some provinces of India, female suicide rates are higher than male rates.
- **Trend in male versus female suicide rates** Usually male and female suicide rates move in the same direction which means that they have a high positive correlation. Yet, there are many exceptions to this rule. For instance, in the period 1974-1981 Japanese male and female suicide rates were negatively correlated. This observation is particularly disconcerting because the observation of a strong positive correlation over many decades may be seen as reflecting a stable structural property and it is therefore difficult to understand what brings about such sudden switches.
- **Influence of population density** In the time of Durkheim suicide rates were higher in big cities than in the countryside. Nowadays, it is the opposite: suicide rates in Montana or Wyoming are about twice as high as in Boston.
- **Suicide rates in time of war** It has been argued that suicide rates decrease in time of war. While this seems indeed to hold for some countries and for some wars, there are many exceptions. U.S. suicide rates declined during World War I and World War II, but they increased during the Korean and Vietnam wars. While both male and female suicide rates declined in Denmark during World War

[1] One can mention for instance the following studies (listed chronologically): Boismont (1865), Le Roy (1870), Cristau (1874), Morselli (1879), Le Goyt (1881), Masarick (1881), Nagle (1882).

I they increased during World War II; thus, the female suicide rate more than doubled from 10 to 23 per 100,000.

- **Suicide rates in armed forces** In the time of Durkheim, suicide rates in the armed forces were two or three times higher than in the general population. Nowadays, however, suicide rates in the armed forces, for instance in the U.S. Army, are at the same level than in the general population.

All these exceptions and broken regularities may seem fairly disconcerting. However, one can observe that all the cases that we mentioned refer to anthropomorphic categories. “Being unemployed”, “belonging to the armed forces”, “living in time of war”, all these notions have no clear and univocal interpretation in terms of network science concepts[2]. In contrast, the regularities that we examine in subsequent chapters are fairly robust and have a clear interpretation in network terms. As we will see there is a clear relationship between various forms of social isolation and suicide.

In the next two chapters we investigate the implications of the marital bond for suicide . Then we explore other situations of social isolation such as the conditions of inmates or immigrants. Finally, we discuss the phenomenon known in biology as apoptosis (often called cell suicide) in the light of the framework built up in the preceding chapters.

[2]To give them a well defined meaning one would have to describe the notions of unemployment, armed forces or war in terms of networks, links and interactions. By doing so, one would discover that in network terms there are *different variants* of unemployment. For instance, a jobless person in a country with a high level of social solidarity such as the Scandinavian countries will keep more social links than would be the case in a country where unemployed people do not benefit from any social protection.