

# HAYEK, 'THE INTELLECTUALS AND SOCIALISM', AND WEIGHTED SCALE-FREE NETWORKS

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*In 1949, Hayek attributed the dominant position of planning in the West to the role of intellectuals, by which he meant 'professional second-hand dealers in ideas' such as journalists and commentators. Later in the twentieth century, we saw a similar phenomenon: particular social ideas, although frequently falsified empirically, have come to dominate through the efforts of intellectuals. This paper addresses how a small minority can set so decisively the terms of the debate. Hayek conjectured that this was the case, but did not specify the mechanism by which this can occur. Recent advances in network theory about how ideas can either spread across, or disappear in, a social network of individuals can explain this phenomenon. The implication of Hayek's insight, validated by modern network theory, is that think-tanks should seek to influence 'professional second-hand dealers in ideas' rather than adopt the naive democratic principle of trying to persuade individual voters.*

## Introduction

Hayek, in his 1949 essay 'The Intellectuals and Socialism', considered the question of how ideas of planning and socialism had come to a dominant position in the market-oriented economies of the West. He attributed this to the role of intellectuals. By the word 'intellectual' he did not mean an original thinker. Rather, for Hayek intellectuals were 'professional second-hand dealers in ideas', such as journalists, commentators, teachers, lecturers, artists or cartoonists.

The opening paragraph of the essay reads:

'In all democratic countries, a strong belief prevails that the influence of the intellectuals on politics is negligible. This is no doubt true of the power of intellectuals to make their peculiar opinions of the moment influence decisions, of the extent to which they can sway the popular vote on questions on which they differ from the current views of the masses. Yet over somewhat longer periods they have

probably never exercised so great an influence as they do today in those countries. This power they wield by shaping public opinion'.

During the second half of the twentieth century, the influence of the concept of socialism in the West weakened. The view that governments can still plan, predict and control outcomes still pervades much political thinking, and the role of the state in the economy remains very much larger than it was in the first half of the twentieth century. But market-oriented thinking has become much more powerful. In part, this is due to a sustained effort to create an intellectual class sympathetic to this view, and in part due to the disastrous performances of planned economies, whether in the former Soviet bloc, Africa or elsewhere. Acute poverty is now a distinguishing feature of anti-capitalist regimes rather than the more market-oriented ones. However, despite the overwhelming evidence of the success of capitalism, it still attracts opposition, often virulent, from many intellectuals.

The success of liberal<sup>1</sup> intellectuals is much more complete in social and cultural policy and debate, a phenomenon which has arisen mainly during the final quarter of the twentieth century. Hayek notes that

'it is perhaps the most characteristic feature of the intellectual that he judges new ideas not by their specific merits but by the readiness with which they fit into his general conception, into the picture of the world which he regards as modern or advanced.'

Just one example will suffice. The view that all types of family structure are equally valid has become an article of faith with the metropolitan liberal elite. Yet it is rejected decisively by all serious studies of the problem. Children brought up in households of never-married single mothers, for example, face a very much higher probability of being consigned to a life of poverty and crime than in households where the parents stay married to each other.

The purpose of this article is to consider how such a small minority can set so decisively the terms of debate on social and cultural matters. Hayek himself is very clear on the matter. He writes:

'[socialists] have always directed their main effort towards gaining the support of this "elite" [of intellectuals], while the more conservative groups have acted, regularly but unsuccessfully, on a more naïve view of mass democracy and have usually vainly tried to reach and persuade the individual voter.'

He goes on later in the essay to state, 'It is not exaggeration to say that, once the more active part of the intellectuals has been converted to a set of beliefs, the process by which these become generally accepted is almost automatic and irreversible.'

Hayek does not specify the mechanism by which the influence of intellectuals operates. Hayek as a thinker was in many ways years ahead of his time. For example, his true importance in economic theory is only now being properly recognised, as the Nobel lecture of the 2002 economics laureate Vernon Smith (2003) illustrates.

His insight about the importance of an influential minority in the dissemination of ideas can now be seen to be correct, using very recent advances in the mathematics of network theory (or graph theory as it sometimes more formally called). The next section gives an overview of the relevant theory, and how it is applied in this particular context. This is followed by a more detailed description of how results are obtained. We then apply these models and set out the results.

## Overview

The analysis of social networks has attracted people from a variety of disciplines. Statistical physicists,

mathematicians, highly numerate US sociologists, though hardly any economists. In particular, we now understand much more than we did even a few years ago about how ideas might either spread across, or disappear in, a social network of individuals. Individuals form their opinions on particular topics in a variety of ways, but an important one is by noting the opinions of others who the individual considers to be significant in the particular context.

A person may, of course, refer to different groups on different topics, so that a group to which an individual pays attention when deciding which supermarket to use might differ from those to which attention is paid when he or she is thinking about a financial decision. These examples are deliberately mundane in order to illustrate the pervasive nature of this phenomenon.

We can readily imagine a variety of different types of social network on which individuals might affect each other's behaviour. In a densely knit community, for example, most people will know each other's business and know what everyone else is up to.

At the other extreme, the community may be highly fragmented, not necessarily in a geographical sense, with individuals having very few social contacts, leading rather isolated lives. Yet another possible structure is one in which most people are potentially influenced by only a small number of others, but a few people are well known to many others.

This latter type of network, in which most people are potentially influenced by only a small number of others but a few people are well known to many others, is typical of many real-world social and economic networks. In its pure, theoretical form it is known, for reasons which need not detain us, as a 'scale-free network'.

Of course, actual networks are never absolutely identical to their Platonic idea in theory. But a number of well-known networks look very similar to the scale-free networks of theory. One example is the World Wide Web (for example, Barabási *et al.*, 2000). Casual empiricism – or everyday experience, to strip the phrase of its social science jargon – suggests that this seems reasonable. A few sites are extremely popular, but most receive only a small number of visits. Gene Stanley of Boston University and editor of *Physica A*, the world's leading statistical physics journal, examined the pattern of sexual contacts with colleagues (Liljeros *et al.*, 2001). They found that this, too, had scale-free properties. A relatively small number of people had a high number of contacts, and most people had a small number. Ormerod and Roach (2004, 2005) argue that this type of network has been an important feature in historical clashes over religious ideology, using the Cathar heresy of the thirteenth and fourteenth centuries and the struggles within English Protestantism in the 1550s as examples.

In such networks, the major disseminators, the very small number of highly connected individuals,

are extremely important in determining whether an idea survives and prospers or whether it disappears. Even if a substantial majority of the population initially hold one of two competing views, say, the minority view can nevertheless come to predominate.

By the very nature of the subject, the literature on network theory is generally highly mathematical. However, in our description of both the analysis and the results, we avoid the use of mathematics. For those wishing to understand scale-free networks more formally, in addition to the empirical analyses of the World Wide Web and human sexual contacts, there are a number of influential recent theoretical examples (for example, Barrat *et al.*, 2004, and Pastor-Satorras and Vespignani, 2004) and one excellent popular discussion by one of the pioneering researchers into this aspect of network theory (Barabási, 2002).

The methodology used to illustrate the point is undoubtedly unfamiliar to most people, but has become standard in the analysis of the spread or disappearance of ideas/infections across social networks. We set up abstract representations of the problem on a computer, and use the power of the computer to obtain the results.

We might think of the representation as describing how a game is played. In this game, there are a fixed number of individuals who can subscribe to one of two competing views. It is easy to allow a choice between more than one view, but the general principles are not affected by doing this, so for simplicity assume there are just two possible views. We can describe these as 'liberal' or 'conservative', in the context of attitudes towards social policy, for example.

The individuals form part of a social network, which by construction has the property of being scale free. A small number of individuals are connected to large numbers of others, but most people connect only to a small number of others.

Each individual forms his or her opinion solely on the basis of the views of a small number of others. The others may be members of the family or friends, but could also be commentators in the media, say, or teachers. An individual is predisposed to continue to hold her existing opinion, but will switch if a sufficient weight of opinion amongst those whose views she considers are of the opposite view. A key point here is that the individual does not simply count heads in thinking about whether or not to change her mind. She takes into account the relative importance of those who influence her, so that a commentator is in general much more important than a relative, say.

Of course, reality is more complicated than this. Any theoretical model, a more formal description than 'game', inevitably involves assumptions and abstractions. So, for example, people may make up their own minds and not really be influenced by

others, or they might be counter-suggestible to the ideas of influential people. But this model is nevertheless useful in understanding how it can be that the views of a small but influential minority can come to prevail as the orthodoxy. It is sufficiently realistic to illuminate the process by which liberal social views have come to prevail in many Western countries.

### Analysis and results

The analysis is carried out by creating networks of individuals on a computer. At any point in time, each individual holds one of a number of competing views. As well as specifying the nature of the network which connects them, there are rules which describe both the initial distribution across individuals of the competing views and how individuals change their minds. The model progresses in a series of steps, or periods. In each of these periods, each individual decides whether or not to change his or her mind. The distribution of views across individuals will in general change with each step. The model is solved for a sufficiently large number of steps for the distribution which emerges to be essentially stable. With 200 individuals, each of which has the opportunity to change its mind each period, running the model for 500 periods and carrying out 500 separate individual solutions of the model takes around five minutes on a standard PC.

At the outset, we populate the model with a fixed number of individuals, and connect them on a scale-free network.<sup>2</sup> Each individual in the results set out below only pays attention to four other individuals in deciding his or her overall persuasion on social matters. But by virtue of the scale-free network, lots of people pay attention to a small number of individuals (the highly connected ones), whilst the opinions of most people are only taken into account by a few others.

We then allocate at random individuals to be either liberals or conservatives, in accordance with proportions which we can specify. For example, we can specify that 10% or 20% of the population are liberals, for example, and the rest conservative. In the more abstract jargon of network theory, we would usually speak not of people but of 'agents', and we would say not that they were either liberals or conservatives, but that they were in one of two states of the world, 0 or 1. Although it is more cumbersome, for clarity we retain the normal, English descriptions.

If we possessed precise knowledge about the initial distribution of views across the particular individuals, we could incorporate this, instead of allocating people at random. Apart from the highly connected individuals, however, this information is extremely difficult to acquire. We overcome the problem by obtaining large numbers of individual solutions of the model, each with a different random

initial configuration. The results in any single solution will be sensitive to some extent to the initial way in which individuals are allocated by the random process. But by obtaining many individual solutions (in the results below, 500 of each), these initial differences will be averaged out.

So each individual solution of the model begins with individuals connected on a scale-free network and allocated to be either liberals or conservatives in the designated proportions.

We now need a rule which specifies how the model evolves over time. In other words, how individuals come to switch their allegiance. The rule is simple but realistic. Suppose an individual is considering whether or not to switch opinion. He or she considers the allegiance of the small number of individuals to whom he or she pays attention in deciding this matter. These individuals are allocated to their respective doctrines, and the relative weight of their importance is added up. The weight is given by the number of individuals each of these individuals influences. Of course, this will not be known precisely in practice by the person considering his or her allegiance. But he or she will be aware of the relative weights and know, for example, that a teacher or a broadcaster is likely to influence many more people than one's wife or brother. By carrying out large numbers of separate solutions to the model we therefore do not need to assume that individuals know these weights exactly, but that in general, averaged across a very large number of individual decisions, the relative weights will be judged accurately.

An individual decides to switch if more than a certain percentage of the total weight of the individuals to whom he or she pays attention subscribes to the rival ideology. In other words, this is a measure of the pressure from the relevant peer group. The more the people to whom an individual pays attention are in the rival group, the more likely it is that he or she will switch. The critical percentage is set by the user of the model. Given that switching is by no means a trivial matter, it makes

sense to assume that a clear majority of the weighted relevant opinion for an individual should be of the opposite view before he or she decides to switch. In the illustrative results below, we set the critical percentage at more than two-thirds (0.67 to be precise). In other words, if up to and including two-thirds of the influence to which the individual pays attention is in the rival camp, he or she remains faithful to his or her original set of views. Only if this is greater than two-thirds will the switch be made. Again, if we had empirical evidence on the size of the critical percentage, we could use it in the model, but in the absence of this knowledge, the two-thirds assumption seems reasonable.

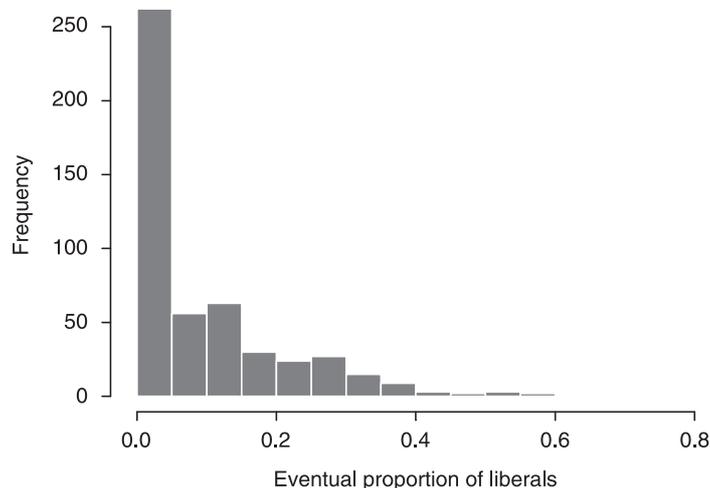
Finally, we specify the rule by which individuals consider whether to switch or not. Essentially, the model moves forward in a series of steps. In each step, every individual considers whether or not to switch. And the order in which they are selected to consider the issue varies at random with each step.<sup>3</sup>

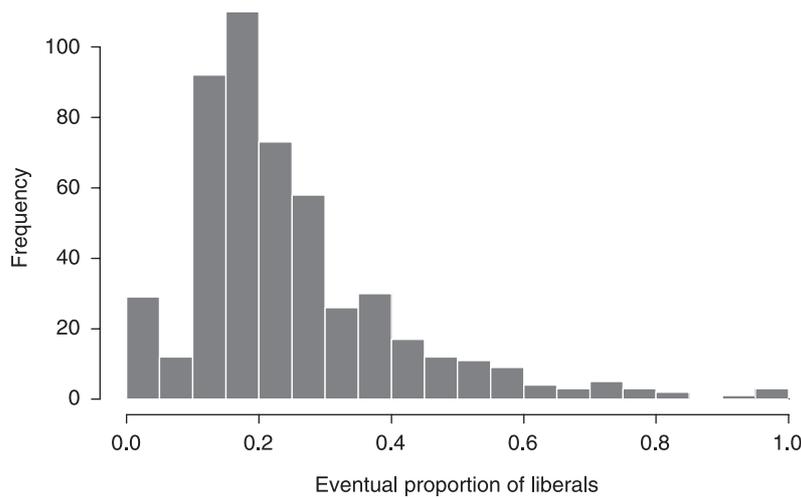
### The results

In the first instance, all individuals are allocated to be either liberal or conservative entirely at random in the proportion 20 : 80. In other words, liberal views are a very definite minority. Figure 1 shows the eventual distribution of opinion across 500 separate solutions of the model. This means that we will get not a single, central answer to the question 'what percentage of people finish up as liberals?', but 500 separate answers. Figure 1 summarises the proportion who finish up as liberals when everyone has had many opportunities to consider whether or not to switch sides.

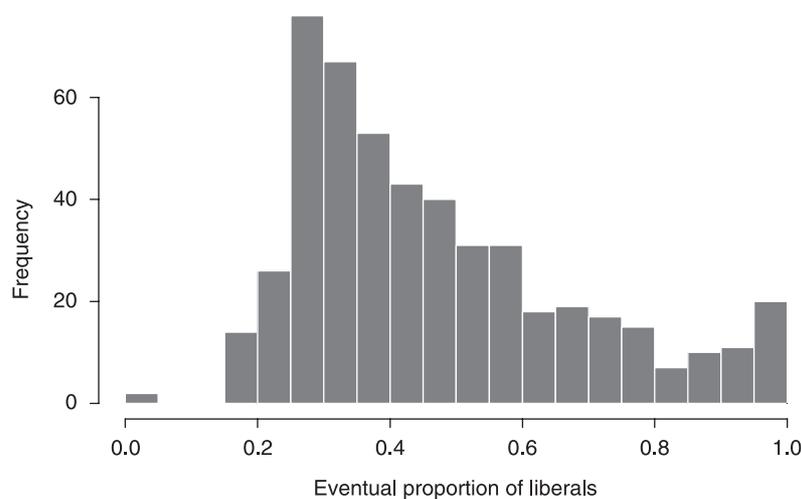
In interpreting this chart, remember that it is summarising 500 separate solutions of the model. Each of the bars corresponds to a range of five points in the proportion who end up as liberals. So in the far left, the first bar contains all the solutions in which the proportion of people ending up as liberals was between 0 and 0.05. Going up the bar and reading across to the left-hand axis, we can see how

**Figure 1:** Scale-free network. The population starts 20% liberal and 80% conservative. Individuals switch views if more than two-thirds of those to whom they pay attention (weighted by influence) hold an opposite view. The most influential individuals also start off 20 : 80 liberal/conservative.





**Figure 2:** Scale-free network. The population starts 20% liberal and 80% conservative. Individuals switch views if more than two-thirds of those to whom they pay attention (weighted by influence) hold an opposite view. The 0.5% most influential individuals start off as liberal.



**Figure 3:** Scale-free network. The population starts 20% liberal and 80% conservative. Individuals switch views if more than two-thirds of those to whom they pay attention (weighted by influence) hold an opposite view. The 1% most influential individuals start off as liberal.

many times out of 500 this solution was obtained: just over 250 times, in fact. So in more than half the individual solutions, liberalism starts off with the allegiance of 20% of the population and ends up with less than 5%. On average, the percentage who eventually subscribe to liberalism is just 15%. Very occasionally, a mere nine times out of 500, liberalism becomes the majority view.

In other words, if the initial population is divided 20–80, and the most connected individuals are just as likely to have been liberals or conservatives as the rest of the population, the chance of liberalism prevailing is very small. Indeed, in general its influence declines.

We now consider what happens if the total population is still divided initially in the 20–80 proportions, but that the most connected 0.5% of individuals always starts off as a liberal. This group is also allowed to change its mind over time, but this tiny set always begins as liberal. Figure 2 plots the range of outcomes.

It looks, and is, decisively different from Figure 1. In general, conservatism remains the prevailing ideology, but the probability of it so doing is very much less. On average, instead of just 15% of the total

population being liberals as in Figure 1, now 31% are. Liberalism becomes the majority view not just on nine occasions out of 500, but 41 times. And this is the effect of fixing a mere 0.5% of the population, the most connected 0.5%, initially as liberals.

If only the most influential 1% begin as liberals, the outcomes shift even more decisively towards liberalism. Figure 3 plots the outcomes.

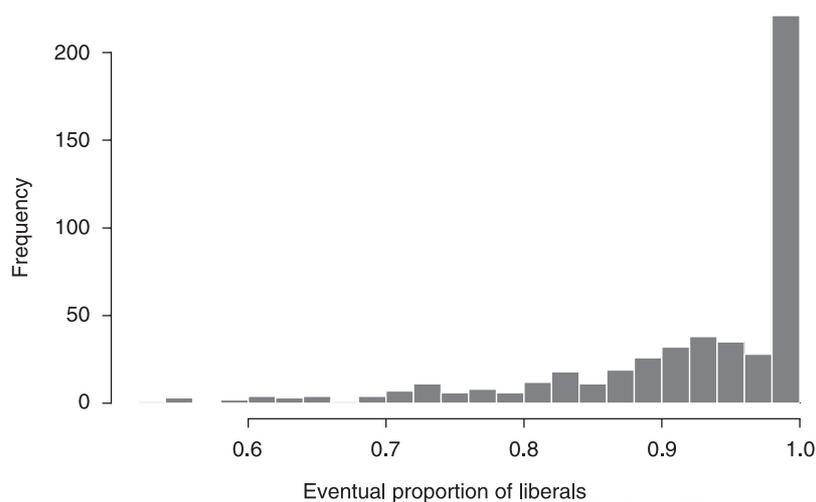
Now, on average, 47% of the population end up as liberals. Liberalism accounts for more than its initial 20% of the population no fewer than 484 times, and becomes the majority view on 179 occasions.

These results illustrate the decisive effect in scale-free networks, particularly when decisions are weighted by the importance of individuals, of the most influential people. The views of a mere 1% can bring about a decisive shift in the likelihood of their particular ideology prevailing.

If as many as the 2% most connected individuals are all liberals at the outset, conservatism becomes close to being eliminated. Liberalism does not end up as the minority in any single one of the 500 solutions. The average percentage of liberals is no less than 92%. Figure 4 plots the outcomes.

**Figure 4:** Scale-free network.

The population starts 20% liberal and 80% conservative. Individuals switch views if more than two-thirds of those to whom they pay attention (weighted by influence) hold an opposite view. The 2% most influential individuals start off as liberal.



If the most influential 2% do start off as liberals, then Hayek's view does seem to be valid, that 'It is not exaggeration to say that, once the more active part of the intellectuals has been converted to a set of beliefs, the process by which these become generally accepted is almost automatic and irreversible.'

Even if the initial proportion of the population holding liberal social views is just 10% and 90% are conservative, under this assumption on average no less than 88% of the population end up as liberals, and liberalism remains the minority, albeit a much stronger one, in only 12 out of the 500 simulations of the model.

The assumption that the opinions of individuals are potentially influenced by the views of others in proportion to their importance does affect the results considerably. For comparison, we report some results which use assumptions which are identical to those above, except that individuals look at a simple head count in deciding whether to switch their own view, rather than a head count weighted by influence. In other words, they examine the views of the four people whose views they take into account, and if three of them (i.e. more than two-thirds) are of a different opinion, they switch, regardless of how many connections each of the four relevant people has.

When everyone is allocated at random at the outset in the proportions 20% liberal and 80% conservative, the outcomes are very similar under both assumptions. Liberals as a percentage of the total population average 14.5% on the unweighted assumption, and 15% on the weighted assumption, again averaging over 500 solutions of the model. The distribution of outcomes across the 500 solutions is not identical in the two cases.<sup>4</sup> The main difference being that, in a few cases, most of the most connected individuals are allocated at random as liberals initially, and their influence leads liberalism to end up in the majority. This happens nine times out of the 500 solutions, but never with the unweighted assumption.

If the most connected 0.5% are allocated as liberals at the outset, with the unweighted assumption the eventual proportion of liberals becomes and remains on average lower than at the outset, being on average 17.5%. This contrasts with 30.5% with the weighted assumption. Liberalism ends up as the majority view on only three out of 500 occasions, compared with 41 under the weighted assumption.

With the most connected 1% allocated as liberals at the outset, with the unweighted assumption, the eventual proportion of liberals becomes and still remains on average lower than at the outset, being on average 19.4%. This contrasts with 47.2% with the weighted assumption. Liberalism ends up as the majority view on only 11 out of 500 occasions, compared with 179 under the weighted assumption.

If the most connected 2% are allocated as liberals at the outset, liberalism starts to percolate much more effectively, even under the unweighted assumption. With the unweighted assumption the eventual proportion of liberals ends up at 54%. This contrasts with 92% with the weighted assumption. Liberalism ends up as the majority view on 201 out of 500 occasions, although this of course compares with 500 out of 500 under the weighted assumption.

In practice, of course, we can readily imagine that the world lies somewhere between the two extremes of assuming that individuals take no account of the overall influence of the individuals whose views they take into account, and of assuming that they assign them the full weight of their overall influence.

## Conclusion

It has to be stressed that this model abstracts from reality. But this network model does illustrate Hayek's insight in realising the central importance of the opinion-forming elite on social and economic

matters, rather than the population as a whole. It is clear from the simulations of the model that, if individuals do take more account of the views of well-connected individuals (i.e. of an intellectual elite) then those views, even if they start off as minority views in the population as a whole, can become majority views. Under certain plausible assumptions, conservative views held by the majority of the population can become views held only by a small minority of the population. Hayek was right to advise Antony Fisher to found a think-tank (the IEA) that would influence intellectuals.

1. Here I use the term 'liberal' in what is sometimes described as its American sense – that is, people who reject traditional values in a social context and take a broadly socialist economic position. Similarly, 'conservative' will be used in its generally accepted American sense to mean somebody who accepts traditional social values and broadly free-market economic values. The common use of the word 'liberal' (together with words such as 'progressive') to mean accepting of socialist economic principles is itself an indication of the success of a certain group of intellectuals in changing language.
2. Formally, in the results below we populate the model with 200 agents, and create a Barabási–Albert–Jeong network in which the number of initial nodes is four and the number of people each node is influenced by is also four.
3. In the results below, we solve the model for 500 steps. This removes unequivocally any particular influence of the initial conditions.

4. Technically, the null hypothesis that the two distributions are the same is rejected on a Kolmogorov–Smirnov test even at  $p = 0.000$ .

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