Chapter 3
Time Differences and International Interaction

Physical distance appears to act as a restraint on interaction at all levels of social organization.[1] However, there is one specific problem connected with high-speed interaction over great distance in the international system—that of *time differences*.[2] In international travel the 'jet lag' causes fatigue and related phenomena. (The problem of a sudden *change of climate* associated with rapid North–South movements has not been studied to the same degree, but appears to be less serious.) In attempting to circumvent these unpleasant effects by interacting through telecommunication (moving information rather than moving people), one runs into a related problem—that of non-overlapping office hours. Informal data from several organizations with international activities are cited as examples of how these problems are dealt with. Technological and social 'solutions' to the problem of time differences are discussed. Several of these raise new problems, among them the possibility of an emerging 'time imperialism'—with dominant nations, organizations, and individuals imposing their own time cycles on their dependent individuals and groups—seems particularly ominous.

[1]This article was originally published in *Cooperation and Conflict* 9(1): 35–51, 1974.

[2]This article is the result of work done over a long time with many interruptions. Most of the data on time zones were collected while the author was a research associate of the Dimensionality of Nations Project, University of Hawaii, in 1969. The rest of the work was done at the International Peace Research Institute, Oslo and the article can be identified as PRIO publication no. 21–23. Previous versions have been presented to the Nordic conference in peace research, Fagerfjell, Norway, February 1972; a PRIO seminar, May 1972; and the IX Congress of the International Political Science Association, August 1973. I am grateful to Jon Naustdalslid for research assistance and to various professional colleagues for comments, particularly Johan Galtung, Johan Jørgen Holst, Tord Høivik, Arden Johnson, and Robert Klitgaard. I am also grateful to various people in business and government in Oslo for giving of their time to discuss these problems. Economic support has been provided by the Norwegian Council for Research in Science and the Humanities (NAVF) and the Norwegian Research Council for Conflict and Peace (RKF).—Postscript 2014: Two of the people who provided information on handling time differences in politics and business, were former Norwegian prime minister Einar Gerhardsen and Jan P. Syse, then a senior executive in Wilhelmsen's shipping line, and later also a prime minister. Why they were not thanked by name, I can no longer remember.

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3.1 Introduction

To winter sports enthusiasts in Norway, the XI Winter Olympic Games in Sapporo, Japan in February 1972 provided a free introduction to the 'Brave New World' in one interesting respect: Televising of the events started at 5:25 in the morning. This is interesting for two reasons: First of all, it was the first time since the Second World War that the Winter Olympic Games had been held outside Europe or the US—yet there was no question of European viewers not getting their full share of 'instant' news. 10 years earlier this could not have been done—15 years earlier the whole idea would still have been science fiction. Secondly, the transmissions could have been instantaneous but, in fact, were not. This was not because of any technical limitation of satellite communication; it must have been a conscious decision on the part of the Norwegian broadcasting corporation (NRK) that 5:25 was the earliest time one could decently shake Norwegian viewers out of bed. (For some reason, radio transmissions started at 5 am.) The reports were seen or heard by hundreds of thousands of Norwegians—according to a poll, 21.1 % of the population heard at least one early morning radio report and 33 % saw at least one TV program between 5:25 and 6:00.[3] For all these people, the NRK decision determined their daily sleep cycle for at least a day, in many cases for the best part of 2 weeks. A technological breakthrough led to a temporary change of life-style.

Just as remarkable as these two points are in themselves is the fact that all this occasioned very little comment. It was not, of course, the first time that a major sports event had been televised world-wide. For that matter, Norway had only had television for a little over a decade. But adjustment to the technological breakthrough had been so rapid that the changes in life-style that they required were hardly remarkable any more.

This example may serve as an introduction to the more general problem: What are some of the consequences of a rapid increase in the speed of communication? These consequences are often discussed under the heading of 'the shrinking globe' or 'the decreasing significance of distance in the international system'. We turn first to an examination of the concept of distance.

3.2 Geographical Distance: Horizontal and Vertical

At all levels of social organization, *physical distance* has a restraining impact on interaction. In a cafeteria, you may more easily—everything else being equal—fall into conversation with someone who shares your table than with someone across the room. In an apartment building, you will more easily get to know those who pass by your door on their way in or out (Festinger et al. 1949). That a similar relationship holds for the international system should come as no great surprise.

[3]According to a survey carried out by the Central Bureau of Statistics (1972).

In recent years, it has become fashionable to proclaim the shrinking world and the decreasing importance of distance in the international system. However, contrary to common thinking (and my own initial expectations), I found in a previous study that distance had *increased* its correlation with one form of international interaction (scheduled international flights) over the period 1930–65 (Gleditsch 1969).

Clearly, *geographical distance* itself is not the mechanism at work. *Straight-line distance* does not necessarily equal *functional distance*. First, the actual impediment to interaction may be *time* or economic *cost* and these may depend on a route structure in an existing interaction network or on physical factors. For pedestrians in a city, city-block distance is a more realistic measure of travel time than bee-line distance. For international air travelers, the belated introduction in 1967 of an air link across the Soviet Union cut travel time between Europe and Japan by as much as 25 %. But distance, and demand on facilities in turn, influence the route structure. Pedestrian passageways can be constructed through buildings in extremely busy sections of a town. When in 1965 Western Samoa was not linked to Australia except via American Samoa or the Fiji Islands, it was presumably because the demand was not heavy enough to justify a direct link across 2,847 miles.

Quite apart from the problem of defining and measuring functional distance in any social system, there is a specific peculiarity about distance in the international system: This is the basic distinction between *vertical distance*, or North–South distance, and *horizontal distance*, or East–West distance. Travelling in an East–West direction one has to overcome a difference in *local time*. In the North–South direction the difference in local climate is a corresponding hurdle. Table 3.1 spells out in detail some salient characteristics of the two.

The impact of vertical distance on international interaction will not be extensively discussed here. This problem occurs only when persons or goods are moved, not with the movement of information. In some cases it can be quite serious. A sudden change in climate (temperature, humidity) or in vegetation can have a marked physical effect on general well-being or specific diseases (such as allergy

Table 3.1 The two components of distance in the international system

	North/South	East/West
Direction	Vertical	Horizontal
Climate	Dissimilar	Similar
Local time	Similar	Dissimilar
Functional distance	Curved, continuous	Monotonic, stepwise
Creates problems in moving *persons* (travel)	Yes	Yes
Creates problems in moving *goods* (trade)	Yes	No
Creates problems in moving information (communication)	No	Yes
Problem is aggravated as functional distance decreases	Yes	Yes
Problem comes into existence only when the speed of movement is very high	No	Yes

conditions). For the community which receives the traveler, it also increases the risk of spreading epidemics. While a Near Eastern cholera epidemic a few decades ago could only have spread to Scandinavia via the intermediate European countries (and probably would have stopped or have been stopped on its way), it can spread today via, e.g., tourist charter flights. Since a flight is completed much faster than the incubation period for a disease, isolating the infected traveler at the point of destination is no longer a viable solution.

However, there are other effective measures for the prevention of epidemics, e.g. mass inoculation. Also, the increased speed of communication has been accompanied by an improvement in medical skills and (for the developed world, at least) an increase in the general health level to a point where epidemics are no longer so serious. More drastic and specific countermeasures are also available, such as disinfecting the planes and the requirement of specific vaccination for travel to certain countries (Leuschner 1965). Vaccination obviously provides a restraint on North–South travel, partly because it involves some physical discomfort, and partly because it involves a time lag for the first visit. This effectively rules out mass tourism. The problems of adjustment to the climatic difference for the traveler himself—although they may be serious in individual cases—are not generally serious enough either to warrant much concern. Indeed, in many cases the climatic difference may be the whole point of the trip, as in modem mass tourism from the Scandinavian countries to the Mediterranean in winter. In general, vertical distance is clearly a less important impediment to international interaction than horizontal distance. In the next section we turn to a closer examination of the problem created by time differences.

3.3 Time Difference and International Interaction

3.3.1 International Travel

Modern man increasingly lives by the clock, thus necessitating a stricter regulation of time. For an increasing number of people (although still a small minority in the rich countries and an even tinier minority on a global scale) *time* is replacing *money* as the most important scarce resource (Linder 1969). One of the strongest forces for standardization is precisely the improved means of communications. Each town or little area used to have its own time, but with the railroad this quickly became impractical. There were 75 different ‘railway times’ in the US before 1883, when US railroad managers set up their own standardized time zones for the purpose of simplifying their schedules. At the same time a movement for standardization was under way in Europe, motivated more by scientific than by commercial consideration. Eventually, within a few decades, most nations adopted one or more standard time zones (Schroeter 1926: II). A few countries, mainly Arab, still stick to ‘sun time’.

A more basic standardization of time is, of course, the daily (diurnal, circadian) cycle. Figure 3.1 gives a generalized picture of the cycle. It applies to such bodily phenomena as *rectal temperature, heart rate, ion excretion*, as well as psychological phenomena such as *fatigue*. The periodicity is partly exogenous to the organism, regulated by such cues as light or darkness and human activities (eating, going to sleep), and partly endogenous, regulated by a biological clock with its own natural period.

A number of experimental studies on people living in dark caves without timepieces have confirmed that the natural period does not equal 24 h, which is why it is frequently called 'circadian'. One set of studies, for instance, determined the natural cycle to be 25.2 h (cf. Pöppel 1972). The endogenous signals can be modified experimentally and can adapt even to quite drastic changes. One such change is the modern East–West flight.

As any air traveler knows, rapid displacement over several time zones causes considerable discomfort. A number of recent studies indicate that at least part of this discomfort is associated with the time shift itself.[4,5] Estimates vary, but the evidence suggests that it takes anything from three days to a week to achieve complete readjustment after a transatlantic flight. For the return trip, readjustment is more rapid. The feeling of fatigue is overcome sooner than its physiological basis and some other psychological functions (decision-making ability, numerical ability) have not been shown to be decisively affected at all. The various studies are not unanimous in their assessment of the significance of time differences. Some

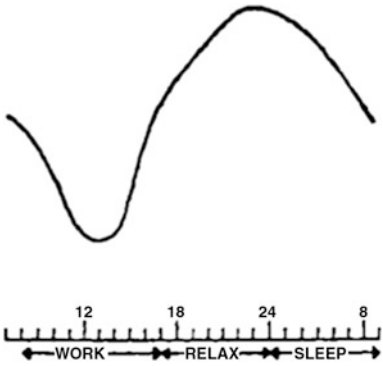

Fig. 3.1 Representative diurnal curve. *Source* Siegel et al. (1969: 6)

[4]Most of the research in this area has not been concerned with the well-being of the passenger, but with the fatigue of the airline crew. This is not an unimportant point in aviation safety: 'One BOAC pilot kept a careful log of his rest and sleep for 18 months … His passengers would not have been reassured to learn that in a representative spell of flying on North Atlantic routes this particular pilot had one period of sustained wakefulness lasting 23 h, another of 33 h except for a 2 h nap, and that he fell asleep for some minutes half an hour before the time for landing.'

[5]Blatt/Quinlan (1972: 507) distinguish between *dysrhythmia*—disparity between the internal clocks and the external temporal referents—and *desynchronization*—disparities between the internal rhythms. In this article we have not made this distinction.

researchers feel that loss of sleep and travel fatigue are more important than the circadian shift (cf. Evans 1970).

The readjustment problems vary with age, the most serious arising for persons whose daily cycle is closely regulated for medical or other reasons, e.g. diabetics.[6]

It is a disputed point whether East–West or West–East flights represent the greatest strain on the organism. On theoretical grounds, it has been argued that it should be easier to adapt to East–West flights because one can more readily suppress than advance sleep (and other periodic phenomena) for a few hours (Siegel et al. 1969: 7). However, the opposite theoretical prediction has also been made, and the experimental results are somewhat contradictory. A behavioral point which I have not found in the medical literature on this issue is that it is far more common to stretch out the day into the night (whether for business or social reasons) than to prolong the day by getting up very early in the morning. That this psychologically facilitates similar behavior after long distance flights seems likely. Furthermore, departures in the West–East direction are often in the evening, with arrival in the early morning. One reason for this is that a 6 h flight means a 12 h difference in local time (because one 'loses time' when travelling from West to East) and therefore difficult to fit a long flight into a normal day. West–East departures across the Atlantic, for instance, tend to be crowded into a few hours whereas the return flights are spread out over a greater part of the day. Psychologically, there is also a temptation to try to make up for the time 'lost' in West–East travel by travelling overnight.

The problem of rapid movement across several time zones is well-known to the experienced traveler. How large this group is, one cannot judge accurately. I am not aware of even rough estimates of what fraction of the population of the world or even of a particular country have had personal experience of the 'jet lag'.[7] However, the role of traveler is becoming sufficiently institutionalized for the

[6]The following informal rendering of a doctor's prescription for his patient's behavior following arrival in Rome at noon (local time) after a flight from Tulsa, Oklahoma may serve as an illustration: Upon arrival in Rome, sleep 2 or 3 h. Awake approximately 24 h after last daily injection of 22 units of NPH insulin. Run a sugar-urine test. Go downstairs and find out where a meal can be obtained so you will know where and when food will be available. Return to room, take 10 units of regular insulin. Eat a dinner within 30 min. Take a walk, see the fountains, sit down under sixteenth century arch to study the fourth century church, and listen to a twentieth century election campaign, loud PA system, records of choir singing. Before retiring, probably ten or eleven Rome time, run a sugar-urine test. Then run an acetone test. Ignore high urine-sugar under these circumstances, but if you show acetone, take 4 units of Regular-Insulin before going to bed. Keep sugar lumps on the table by your bed at night and in your pocket by day. Awake in the morning to a real Roman morning. Run sugar-urine and acetone tests. Take usual 22 units of NPH insulin. Eat breakfast Roman-style, enjoy the hard bread and the caffe latta (sic!) with your usual 2 units of protein. At this point, insulin time is synchronized with Rome time and you are on your own. *Source* Carney (1968: 10). Alternate plans deleted. This author accepts no medical responsibility for the plan!.

[7]The number of transatlantic passengers in 1971 was 11.3 million, rising 16 % p.a. over the preceding decade, according to IATA and related statistics. From the US we know that air travel has a very skewed distribution. In 1962 the top 25 % of business travelers accounted for 73 % of

problems to be felt as an institutional problem, too. Business organizations and foreign ministries and other bureaucracies with a high number of 'jet set' executives are beginning to have to face the problem. We shall return later to some of the solutions that have tentatively been introduced in order to deal with the problem. Let it suffice to note here that the diffused awareness of the problem makes it not unlikely that it may have a muffling effect on enthusiasm for international air travel across several time zones and that, conceivably, the effect may be read off directly in travel rates.

The International Civil Aviation Organization (ICAO) has summed up the strain on the international air traveler and the required rest period in the following formula, sometimes called Buley's formula (cf. Finkelstein 1972):

$10R = tt/2 + (tz - 4) +$ dep coeff + arr coeff

(or $10R = tt/2 +$ dep coeff + arr coeff for trips across less than four time zones)

where

R is the rest period in days, rounded upwards to the nearest $1/\sim$ day

tt is travel time in hours,

tz is the number of time zones crossed,

dep coeff is a special departure coefficient

and arr coeff is a special arrival coefficient.

As an example, an air traveler leaving Montreal at 1800 local time is scheduled to arrive in Paris at 08:00 local time. The rest period is then $(9/2 + 1 + 3 + 4)/10 = 1.25$ or rounded off to 1.5 days. The two coefficients give some weight to departures and arrivals at inconvenient hours, to compensate for lost hours of sleep.[8]

The formula further gives greater weight to *travel time* generally, than to the East–West factor. Vibrations in the plane, the lack of movement in a restricted space, the drop in air pressure (even in pressurized cabins) and many other factors which apply to all flights, lead to a feeling of fatigue. However, it is at least conceivable that these factors may be eliminated by new technological developments. There is no similar way of eliminating the time difference although technological attacks on the effects of time differences are being attempted, too—as we shall see presently.

There is no built-in compensation for the effect of climate differences in the ICAO formula. A 1965 study carried out by the Office of Aviation Medicine of the US Federal Aviation Agency (Hauty/Adams 1965: 1) concluded that the North–South flight did not lead to a shift in the circadian cycle, but that it did lead to an

(Footnote 7 continued)

all business air trips and the top 6 % for 26 % of all non-business air trips (Lansing et al. 1964: 96). However, one can only guess how many *different* people have crossed the Atlantic in a given year.

[8]Thus, a poor arrival time on any other standard can be made into a virtue. An SAS advertisement explains that arriving in Tokyo 09:05 on Sunday morning is just ideal since it gives one a whole day to relax and adjust.

Table 3.2 Seven measures of distance and one form of international interaction, variable definitions and source

Concept	Measure	Year	Source
Horizontal distance	Difference in longitude	1969	Gleditsch (1969)
Vertical distance	Difference in latitude	1969	Gleditsch (1969)
Bee-line distance	Great circle distance	1969	Gleditsch (1969)
Climate difference	Similarity/non-similarity on Köppen's climate scale	1960	Köppen (1900); Rumney (1968)
Wealth difference	Difference in GNP/cap	1965	UN statistics
Travel fatigue	ICAO formula		See above, p. 43
Time difference	Absolute difference between time zones	1969	Time zones coded from airline schedules and reference works
International flights	No. of weekly scheduled flights between the two countries		Gleditsch (1969)

increase in 'subjective fatigue'. In no study that I have seen have the three effects of time difference, climate difference and travel time been systematically untangled.

There is, of course, nothing magical about the ICAO formula. However, it sums up the perception of an important international agency of the magnitude of the problem.[9] Conceivably, there could be important effects from the perception in the travelling community of the effects of time differences, even if the image did not have sound medical bases. The only way to study this would be by a thorough examination of travel rates in all directions. Here, we shall only report a preliminary test.

We have computed correlations for seven measures of distance (functional and otherwise) for one form of interaction, international flights. Table 3.2 surveys the variables.

Correlations were computed between these variables for 24,090 nation dyads and a typal analysis performed on the correlation matrix. Figure 3.2 depicts the statistical relationship between the variables. The only high correlations (>0.75) are between great circle distance, ICAO travel fatigue, East–West distance, and time difference. The correlation between East–West distance and great circle distance

[9]However, the acceptance is not unanimous. Secretariat members tend to push for longer rest periods, whereas the personnel office tends to prefer more conservative estimates. Other special agencies of the UN have not, so far, accepted the ICAO formula, nor does this appear to be the case in national bureaucracies with much international travel. The importance of rest is well known, of course. In travelling to China in 1972, President Nixon made overnight stops both in Honolulu and Guam.

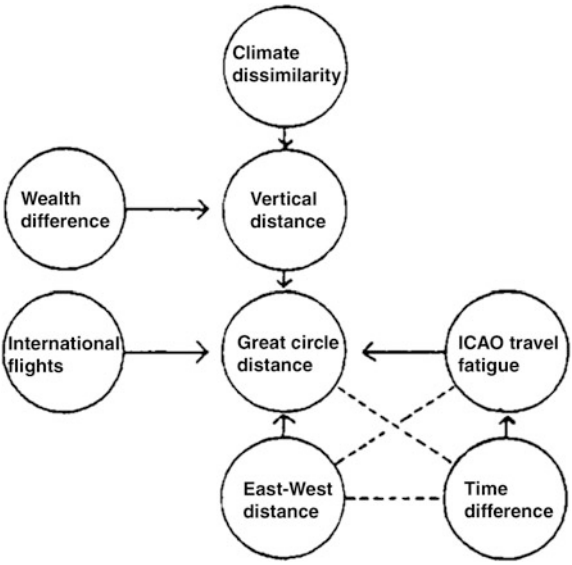

Fig. 3.2 Statistical relationship between seven measures of distance and international flights, 1965. Based on product-moment correlations and a 'typal analysis' (McQuitty 1961) of the correlation matrix. The relationship A → B means that variable A has a higher correlation with B than with any other variable (negative correlation in the case of flights). Broken lines indicate other correlations ≥0.75. All remaining correlations are ≤35. The full correlation matrix is reproduced in the Appendix

(0.9) greatly exceeds that between North–South distance and great circle distance (0.35). This, incidentally, tells one something about the geographical structure of the world: most countries are distributed along a relatively broad band on both sides of the Equator. There are no capitals north or south of the polar circles and very few north of 60° or south of 40°. Hence, if travel was randomly distributed between countries, there would be more travel in the East–West direction than North–South. In this sense also, time difference becomes a more important problem in international interaction than climate difference.

As one would expect, *climate dissimilarity* and *wealth dissimilarity* are statistically associated with *vertical distance*. However, the linear correlations are generally low.

The correlations with the indicator of international interaction (international flights) are not high either. In a linear model, the distance measures have a multiple correlation of only 0.2 with flights. Previous studies have shown that multiplicative models of size and distance variables usually account for more variance in interaction than linear models (Gleditsch 1969 and references therein). However, multiplicative models have not been tried out in this case. Great circle distance and East–West distance are the two variables which together account for most of the

variance in flights. But other variables beyond the first add little to the variance reduction.

As is evident from a glance at a world map, more countries extend in the North–South direction than East–West. Hence, for purposes of intra-national travel, vertical distance is more relevant than horizontal. (Where the 'social axis' of the country is East–West, even though the country extends geographically North–South —such as in Chile—the East–West distances are likely to be small, and no problem arises.) But more important and for precisely the same reason, because the three great oceans (Indian, Atlantic, and Pacific) divide vertically between nations rather than horizontally, distances between nations tend to be horizontal rather than vertical. It is to be expected, then, that great circle distance and East–West distance should be highly correlated (0.9). However, the lack of data on national product for many countries in the South and the lack of a climatic classification for a number of countries, exaggerates this correlation somewhat. Countries for which no data were available on one or more variables had to be excluded from the analysis, and more of these were in the South than in the North.

This tentative analysis supports the greater emphasis of the ICAO formula on geographical distance than on East–West distance. However, in a stepwise regression analysis, East–West distance was found to be the second most important predictor of flights. We conclude then, that while there are certainly many other important factors in determining global interaction patterns, medical research and a preliminary analysis of interaction rates agree that geographical distance is still an impediment to interaction and that horizontal distance is a more important impediment than vertical distance.

The increasing *speed* and decreasing (relative) *cost* of travel, have removed some of the negative effects of distance but the problem of travel fatigue, etc., in long-distance travel generally and East–West travel in particular, is only aggravated by the same trend.

One possible solution to the whole problem would be to reduce the importance of travel, and rely more on telecommunication, communicating symbolic information rather than persons. This possibility is examined in the next section.

3.3.2 Communication without Travel

A great deal of technological innovation is now geared toward this end. The letter and the cable were the first primitive steps and both are now rapidly decreasing in importance. The telephone and telex are currently the most important modes of communication for decisions of great significance or decisions which have to be made fast. Telex makes possible a practically instantaneous communication of written messages. The telephone message permits greater flexibility because it is oral and the lack of any record of the message permits greater freedom of expression. However, telephone messages can also be recorded for future use if desired (and, as we have now learned the hard way, even if not desired). The

conference phone extends the use of this medium from bilateral to multilateral conversations. The conference videophone is merely an extrapolation of technological capabilities,[10] while the smelling picture phone probably requires some new technology (and, in any case, seems less important). Communication satellites and other technological innovations have multiplied the number of available channels for long distance telecommunication. Telecommunication networks no longer know any insurmountable hurdles in terms of geographical distance, although the quality of the network varies considerably with, e.g., the economic level of different countries. In effect, then, quite complex transactions can be carried out without moving the agents physically.

However, there are limitations to this. As any businessman knows, difficult negotiations can be helped along by a good dinner, a relaxing drink or a lively evening out. Electronic communications media have no satisfactory substitute for these icebreakers. To a certain extent, just as the telephone and telex have replaced the letter as the business mode of non-personal communication, the airplane has replaced the railroad and the ship in the movement of persons. This does not necessarily alter the mix of face-to-face and non-personal communication. Technology has an edge now, since a phone call or a telex message can be relayed faster than one can fly to the point in question. In the old days a letter was no quicker than the steamship or the railway and then one might as well have travelled in person. Furthermore, the telephone (but not the telex) will permit instant two-way communication, which comes much closer to face-to-face communication than the letter does.

But in actual fact, the two modes of communication appear to increase in volume together, rather than compete for demand. Routine business and items which require a very fast reaction can be handled by symbolic communication, while more basic transactions which take time anyway can still best be taken care of by face-to-face communication. The initial 'acquaintance process' in particular needs face-to-face communication. If at least one of the interacting partners belongs to a culture with a high personnel turnover in the relevant roles, the need for face-to-face meetings in order to 'get to know each other', will be more or less constant. Besides, vital messages cannot always be sent by telephone if the line is not secure.[11]

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[10] A trial effort has been set up by the General Post Office in Britain under the name of 'Confravision'. So far the system only links Gresham St in the City of London with a post office research station near Wembley. However, a fully developed UK network is being planned, complete with tape recorders, photocopying machines, and scramblers. The suggested price is 120 pounds per hour between London and Manchester. An interesting psychological point in connection with 'Confravision' is that it will—at least in the beginning—impart a sense of urgency and contribute to a streamlining of the discussion (cf. Baxter et al. 1970: 93–97).

[11] 'Office work is conducted with only the rarest recourse to the telephone. Washington does not call because when it is noon in Washington it is midnight in New Delhi, give or take an hour or so, and the line is not secure' (Galbraith 1970).

Thus, we do not believe that the problem of overcoming the restraining effect of distance in general and time differences in particular can be overcome by switching to non-personal communication. However, it is possible that the ratio of non-personal to face-to-face communication may increase somewhat.

This does not eliminate the problem of time difference, however. Time differences also mean non-overlapping working hours. There is no overlap in the normal working day between Tokyo and New York City or between Tokyo and the capitals of Western Europe.[12] This means that one cannot use the telephone for less than vital messages. A telex message from London to Tokyo will arrive after hours and can only be dealt with the next day. When Tokyo gets around to replying, London is off work. The effect of all this is that we are back to one-way communication patterns which are not significantly faster than the movement of persons. Thus, if the matter is urgent, an executive may as well fly from New York to Tokyo or vice versa for a consultation, rather than send a telex message.[13]

The exception to this rule lies, of course, in the possibility of calling outside normal office hours. There are strong norms against doing this within the same city or country where there is no time difference. There is a strong and mutual interest among decision-makers, business or otherwise, in safeguarding the privacy of one's home (or the privacy of one's spare time). In international communication, however, the problem of non-overlapping business hours complicates the issue.

As technological possibilities improve, two-way communication (phone calls) outside regular business hours will no doubt become a more common phenomenon. At the same time, the volume of one-way communication will also increase. The wire services will send out messages on a 24 h schedule, particularly as events that are universally defined as 'news' are produced in more countries all over the world. There will be increasing pressure on the radio and television stations in all countries to continue to extend their program time (as they have done in the past) for news programs, but also for relaxation, as the number of working hours decreases. There may be political decisions to delay events by a suitable number of hours to fit the news schedules in the receiving country, as the introductory example of the Olympic Games demonstrates, but as one medium competes with another the situation will be increasingly difficult for those who always lag behind. In the case of the Norwegian coverage of the 1972 winter Olympics, for instance, the main results would frequently be known from the radio before the television program even started. Enthusiasts who listened to East German radio might even have heard the results before going to bed at 1 am. In the long run, this kind of competition will probably give a country or a medium the image of always being 'last with the news'

[12]Among the 219 nations and territories in the world in 1969, the number of non-overlapping countries ranged from 30 (France and other countries on Central European Time) to 169 (Fiji and others). This was calculated with exact knowledge of the time position of each country but with the naive assumption that all countries had working hours from 09:00 to 17:00 local time.

[13]The working day is de-synchronized even more by the variation in lunch hour habits. In Europe alone, the lunch break varies in length from 20 min to 3½ h, and nominal starting time is different from country to country, too.

and it is difficult to imagine that this will not lead to pressure—internal as well as external—to take up the challenge.

Business information will be a particularly important form of news transmitted on a 24 h basis. The Associated Press/Dow Jones Economic Report, for instance, provides around-the-clock information from news rooms in New York and London. Once the information is available in a country (as it was in Norway in 1971–72) there may probably be local pressures for dispersing it within the country.

Clearly, the problems associated with time differences call for inventiveness, technological or social or both. But before we attempt a systematic discussion of possible (desirable and undesirable) responses, we shall give two examples of how two large organizations have experienced these problems and attempted to handle them.[14]

3.4 Examples

3.4.1 An International Business Organization

The domination of one wall in the telex room by half a dozen clocks indicating the time in different places all over the globe, serves as an instant reminder that a shipping organization is extremely sensitive to the problem of time differences. Executives, in fact, call the telex room quite frequently, asking the time in Tokyo or Cape Town, rather than taking the risk of making an error in their private calculations. The shipping market is an international one and its centers have shifted after the war from Europe (particularly London) to New York and Tokyo. Moreover, it is a market where big decisions have to be made fast.[15] This is particularly true in cargo chartering (as opposed to the line trade). A customer may want to charter a 100,000 ton ship for 3–5 years and the decision has to be made while the agent is on

[14]In addition to non-overlapping working hours, there is also the problem of non-overlapping public holidays. For instance, Norway has three public holidays at Easter—not counting Palm Sunday and Easter Sunday—while many other Christian countries have none. The New Year is celebrated at several different times in different cultures. Goody (1968: 37) reports that Brazil has 18 bank holidays, Britain 6, and Bulgaria 5. The example indicates a certain rationalization in 'modern' societies (i.e. in this context, societies where time is scarce). Throughout antiquity and the Middle Ages, there used to be no less than 115 public holidays during the year (Craven 1933 [quoted from Linder 1969: 26]). Now, public holidays are removed while vacations are increased. Still, a major financial institution has found it necessary to issue a list of Bank and public holidays throughout the world (New York, Morgan Guarantee Trust Company, Ltd. 1965). And in Norway in early 1972 an international gang systematically exploited a Swedish bank holiday to pass forged Swedish checks in Oslo banks (cf. *Aftenposten*, ev. ed. 7 February 1972).

[15]This is not limited to shipping, of course: 'In 2 min this man buys and sells more money than you could make in twenty lifetimes. The man is Jan Gorski. Chemical Bank's chief foreign exchange trader in New York. In 2 min, recently, Jan and one of his staff bought and sold one hundred million Deutsche marks …' (from a Chemical Bank advertisement).

the phone from New York or Tokyo. The price of the phone call is not a factor in cases like these, but time is.

In order to cope with increasing international communication, this shipping agency has joined with a Japanese firm in an interesting international operation. The working day for this international firm starts in Tokyo. At the end of the working day in Tokyo a long report is sent by telex to Oslo. Here, the information is passed directly on to London (technically this is done by feeding the output paper tape from the telex into the input tape reading unit of the telex—thus, only a minimal time lag is involved). At the end of the Oslo working day information and control are passed on to New York and then again to Tokyo for a new day. This is, in a sense, a form of international three-shift working system. However, the three centers are not completely equal. Oslo wants to retain ultimate control and Tokyo and New York (and London) only have limited discretion. For bigger contracts, the branch offices have to consult with their counterparts in Oslo. The instant decision on a 100,000 ton ship may therefore have to be made at two o'clock in the morning. Not only does the shipping agency maintain a regular telex watch until seven o'clock in the evening, but quite frequently the telex lines well be held open far into the night if an important message is expected. Executives call the cable office at seven o'clock and at ten o'clock in the evening (as well as three times on Saturdays and twice on Sundays) to check incoming cables. The cable office also holds standing instructions to call executives at their homes if important cables are received (such as notification of accidents).

An interesting aspect of this particular international operation is that an organization in a small and peripheral country is the dominant center of the joint operation. The normal pattern would be for the dominant partner to be located in a dominant country (e.g. the IBM or the ITT with their head offices in the US and a number of branches in foreign countries). In this case, there can be little question as to *who wakes whom*: The dominant partner contacts the dominated partner at an hour convenient to the former, but there is no disturbing the peace in reverse unless absolutely necessary. In other words, the dominated and peripheral partner yields to the daily cycle of the dominant and central partner. However, in the case just mentioned, the dominant partner has to adapt to the time pattern of the dominated. The country dominance factor appears to be more important than the organizational dominances. In part this may be because organizations in dominant countries are used to determine other people's time, rather than have the reverse happen to them. But a more important explanation is probably that the organization in the peripheral country has to adjust to the market, which in turn is adjusted to the dominant country. Of course, this may vary between one form of interaction and another. In shipping, the central decision-maker must be available at all times. In other multinational ventures, it may be more important for the peripheral parts of the organization to be available to respond to the whims of the center.

3.4.2 The Foreign Ministry of a Small Country

The structure of information gathering in foreign ministries has changed in the postwar period with decreasing emphasis on the traditional formal reports and increased use of telex, cables, and telephone communication. Personal meetings—often in stopovers before or after another meeting or conference—are also more frequent and, as a result, much less formal than before (fewer dinners, more political talks).

However, so far this has not led to any drastic change in the working habits of the Norwegian foreign ministry. Evening meetings are quite common—two to three times a week at the top level in the fall season (which is the busiest because of the UN General Assembly). But the overwhelming number of such meetings are held because of a general scarcity of time and because other commitments sometimes do not permit undisturbed meetings during the office day.

Even so, it is not unusual for foreign ministry officials and politicians to have to make sudden decisions outside working hours, and even in the middle of the night. This is particularly frequent during sessions of the General Assembly. But rather than channeling new instructions through the regular foreign ministry network, a member of the New York delegations will call a top official or politician at his home directly.

So far only the UN has presented a significant number of problems which demand an urgent decision. But similar problems were anticipated at the time of the interview in connection with the UNCTAD III conference in Chile, '9 h away' from Norway.

Bilateral contacts with other foreign ministries by telex, telephone or cable are extremely rare. Personal meetings on a bilateral basis are somewhat more frequent, but less numerous than multilateral contacts (in the UN and NATO particularly, now also MBFR, CSCE, etc.). But the traditional channel of communication, through the embassies, still remains the most important.

Intra-Scandinavian contacts are an exception. Here, telephone calls are quite common, from the foreign ministry level down to preparatory clerical level. Ordinary telex lines are also used frequently. There is a great deal of mutual confidence, and officials are often on first name terms. When such personal contacts are made outside Scandinavia, on the other hand, there is something dramatic about them, they are news. A prime example was a cable sent in December 1971 to the Norwegian Prime Minister from the British Prime Minister urging moderation in the negotiations with the European Community.

Compared with international business decision-making, as described above, international foreign policy decision-making takes on a somewhat old-fashioned tinge. One cannot escape the feeling that just as the intra-Scandinavian embassies are increasingly irrelevant for important political decisions, extra-Scandinavian contacts will also have to be made on a more direct basis at some point. This is, of course, particularly true for crisis situations but even in non-crisis times the contrast

with business decision-making and with intra-Scandinavian decision-making will probably make itself felt.

Another structural factor of some importance is that the foreign ministry is centralizing. The central administration is strengthened and the embassies to foreign countries—as distinct from representations at international organizations—are reduced in importance, if not in number. (In any case, their number has not kept pace with the growth in independent countries.) At the same time, increasing foreign travel for diplomats stationed at home is explicitly foreseen. This means that the problem of long-distance travel will have to be faced more seriously. So far, no formula like that of the ICAO has been applied by the foreign ministry and an official who wants to extend a visit in order to incorporate a rest period, may run into administrative problems. At the same time the lack of permanent representation in a number of important cities will necessitate more frequent use of telecommunication.

3.5 Technological 'Solutions'

If a worn-out phrase like 'a technological age' should be applied to our time, the most appropriate reason would seem to be our tendency to look first for technological solutions whenever new problems arise. This is particularly true when the problem occurs in the first place as the result of a technological innovation. Even though, as we have stressed before, the problem of time differences is only beginning to make itself felt, a number of wheels have already been set in motion to break the back of the problem.

As the previous discussion indicates, there are two separate problems: (1) the circadian shift in international travel, and (2) the problem of non-overlapping working hours in telecommunication. Of the four technological solutions we shall discuss in the following, the first three refer to international travel, the last to telecommunication.

3.5.1 The Pill

If there were no diurnal cycle, there would be no problem. But man would also be a rather different animal. I have not come across any suggestion to eliminate the diurnal cycle. But travelers are frequently advised to try to adjust to the problems of time shifts (don't drink too much, don't eat heavy meals, depart in a rested state, rest after arrival, take it easy during the asynchronous period, etc.). Apparently all this is not enough, for there is at least one project to develop 'a pill' which will expedite the adjustment of the cycle to a new time zone. No serious discussion of the effectiveness of such a pill or of possible side effects has yet come to my attention but as a skeptical layman I feel inclined to think that there must be side

effects which would probably be harmless for a few trips per year across the Atlantic, but not for travel several times per week.[16]

3.5.2 Transcendental Meditation

Recently, according to a report in the *New Scientist*, a number of papers have appeared in learned journals about the physiological changes accompanying transcendental meditation. These changes include a decrease in metabolic rate and in breathing rate, an increase in skin resistance, a reduction in heart output, etc. In short, in the words of a leading spokesman, 'the body is deeply rested, but the mind remains alert'. TM has been used to cut down on smoking and the use of tranquilizers and stimulants and even drugs. The latest claim is that it enables its practitioner to avoid the unpleasant consequences of jet lag.[17]

3.5.3 Sticking to One's 'Home Time'

For those who frequently travel across several time zones, the best strategy may be to try to stick to their 'home time' and make their stay short enough to return to base before the organism has time to adjust.[18] This in a sense is a social and not a technological solution, but it is one which is backed up with a great deal of technology and is therefore dealt with in this section. The most important technological innovation geared to this strategy is probably the SST. An objection often made of the SST project is that it does not make much difference if one crosses the Atlantic in 3 h rather than seven. The objection would probably be muted if it was a matter of cutting in half one's own daily travel time to work or even the weekly travel time to a summer place in the country, etc. Furthermore, many flights are considerably longer than the Atlantic crossing. By late 1972, the Los Angeles to Hong Kong record (7,677 miles) was 14¾ h. But what is perhaps more important, the SST opens up the possibility of travel, e.g., across the Atlantic on one's home time. Table 3.3 sets out a hypothetical travel and conference schedule from New York to

[16]The development of such a pill at the Syntex Corporation appears to be running into difficulties, and marketing of such a product is way into the future. Kahn/Wiener (1967) also mention 'controlled or supereffective relaxation and sleep' as likely inventions in this century.

[17]New Scientist (1973).

[18]Henry Kissinger, in twelve secret visits to Paris during the Vietnam negotiations, made the trips so short that his absences from Washington would not be noticed (and were not!) He 'kept his watch on Washington time' in order to minimize the effects of the time lag. A few of these round trips were completed in 22 h, and he occasionally arrived back in Washington so late that the 'post-mortem' with President Nixon was held in the latter's bedroom. *Time Magazine*, 7 February 1972.

Table 3.3 A hypothetical day trip to London for a busy American after the introduction of SST

New York local time	Scheduled item	London local time
8	Depart	13
11	Arrive	16
15	Depart	20
18	Arrive	23

London and return. A busy American can travel to London, have a three hour conference, and return to New York, all in a not unreasonably long day.[19]

It can be argued that this type of lifestyle applies only to a minute fraction of the population in the two countries involved and that the benefits are greatly outweighed by the environmental hazards of the SST, which have consequences for nearly everyone. This would be a valid point if there were to be a referendum on the SST, but it carries relatively little weight if all the relevant decision-makers belong to the jet set.[20]

With the reduction of flying time, ground time occupies an increasing fraction of total travel time. There will also be consumer pressure for simplification of airport procedures and for more efficient mass transit between airports and population centers. The increasing size of airports and the tendency to locate them further away from cities will, however, work in the opposite direction.

The 'sticking to one's home time' strategy is being applied already, even without SSTs. According to a news report,[21] the International Telephone and Telegraph Corporation holds monthly European meetings for 150 top managers from Europe and the US.' The windows are curtained to banish time. Most members of the Manhattan contingent, who fly over by chartered Pan American 707 jet, keep their watches on Eastern Standard Time.[22] There is no smoking allowed and only mineral water is available.

[19]Although this example was made up, I was gratified to find later that the Director-General of SAS has made the same point: 'What is really the advantage of SSTs?—You fly to America in about 4 h and can get back the same day after lunch and work. This is what you do today when you go to London, Stockholm, Copenhagen, or Paris. I think it will be just as necessary and natural in 10 years to fly to the US on the same basis.' (Hagrup 1973).

[20]For those who argue that the high costs of supersonic service will prove its demise, a US survey by Market Facts (as reported in *Flight International*, 10 May 1973) offers scant hope: 239 business travelers were interviewed. They had made a total of 743 business trips in the previous 12 months, of which 553 were economy class. Some 70 % of the economy class passengers indicated that they were prepared to pay a 40 % higher fare to fly in a one-class Concorde. It was further estimated that 12 % more trips would have been made in 1972 if a Concorde service had been available. In other words, the business community is highly responsive to cuts in *travel time*. The explosion in charter traffic shows that there is another market which is more responsive to *price cuts*.

[21]Story and quotation from *Time Magazine*, 20 December 1971.

[22]Provided, of course, that they have not purchased the new Accutron wrist-watch with 2 h hands, one of which 'tells the time where your mind is', the other 'the time where your body is' (as

This strategy is only possible if the stay is made relatively short and even then it helps to shut out external cues like daylight, which would set the cycle change in motion. For industrial workers on all-day shifts, such a strategy may actually have negative effects: 'Industrial workers who start shift work often change their sleeping hours only on days when this is imperative and on off-days continue to sleep at night, trying to live according to normal time routines whenever possible, with the result that they never adjust. Consequently, their circadian temperature may merely flatten, leaving them below their best potential while at work.'[23]

Finally, while 'solving' the problem of adjusting to international travel, this strategy shifts the problem into the other area discussed previously, that of non-overlapping working hours. If the traveler will not yield, his host may have to.[24]

3.5.4 Changing the Light Cycle

It would be simple, of course, if one could change the cycle of night and day so that all countries would be on exactly the same schedule. In theory there is no great problem in designing a set of gigantic mirrors which would reflect the sun evenly all over the globe at the same time (and perhaps absorb the energy from the light for the night period). In practice, this idea belongs to science fiction, although the idea of illuminating parts of a country was discussed in connection with the Vietnam War.

3.6 Social 'Solutions'

Technological solutions to the problem of time differences appear to raise (at least) as many problems as they solve. But are there any social responses, solutions that involve a particular organization of world society or a particular life-style for its members? Of course technological innovations may be part of such solutions, but the focus here is on the social innovation. All of these 'solutions' apply to the

(Footnote 22 continued)

advertised in *Playboy*). Or the $575 computerized Bulova clock which on demand will flash the time of day in any major capital (as marketed by a US airline) etc.

[23]The quotation is from an editorial in the *British Medical Journal* (1970: 760). The three-shift system, 1 week to a shift, may be the worst of all possible systems. If it takes a week to adjust to an 8 h change, the shift worker will be in a constant state of adjustment to his current schedule.

[24]'Sticking to one's home time' as a response to time differences has a parallel as far as climate differences are concerned: the increasing use of climate control for buildings and even whole cities, will enable the traveler to stay in his 'home climate' or at least a 'standard international climate' for the duration of the trip.

problem of non-overlap in working hours. The third and the fourth are also relevant to the problem of travel.

3.6.1 Time Imperialism[25]

The most likely development seems to be *the imposition on small countries of the time cycle of the dominant countries*. It is illuminating that for branches of international businesses located in Norway—whether dominated or dominant inside the organization business—*the Norwegians are the ones to be awakened*. International stratification seems to take precedence over organizational dominance. The economic and political dominance system of the world extends itself into other areas like 'time'. It is typical that when the standardization of time on a world-wide basis was first seriously discussed in the 1880s, one of the more prominent proposals was for a *world day* which would begin with midnight in Greenwich. The proposal was rejected, however, because of the inconvenience of beginning work at nominally different hours in different places. The actual outcome of the standardization—the 24 time zones—is also centered around the observatory in the capital of the dominating country of the day—but in a less drastic way. Time was not ripe for the more drastic solution of the 'world day'.[26] In a few years' time, however, the world may be ripe (not by decision, but through practice) for an infinitely more drastic

[25]The use of the word 'imperialism' in this context should be understood as a characterization of inter-personal relations as much as inter-nation relations. Raimo Väyrynen has criticized the present paper for directing attention to the problems which still mainly concern a tiny élite whereas the problems of three shift workers, etc., are discussed only parenthetically. If time imperialism were the central focus of this paper, this criticism would be justified. In 1971 it was found in a survey of three Norwegian male cohorts (1921, 1931, 1941) that 10–15 % of those employed had irregular working hours, with little variation between cohorts. Nearly 10 % were weekly commuters. (Unpublished data from the Norwegian Occupational Life History Study, Institute of Applied Social Research.) It must be assumed that for the vast majority of them this irregularity is other-imposed rather than self-imposed, as for many artists, intellectuals, etc. Whether domestic time imperialism will still be more important than the inter-nation variety in the long run (e.g. half a century from now) I feel less certain about. At least the two will become more strongly intertwined. It should also be remembered that even if long-distance travel and occupations with international involvement are (still) mainly concerns of the elite, international mass communication is not. The TV and radio transmission of the Olympic Games were mentioned initially. Other programs that come to mind are 'European pop jury' and the Eurovision song contest. And in the future the global song contest and international televised political debates? If the Security Council and the General Assembly of the UN were more like national parliament in that they made decisions that were (a) important, (b) in some degree unpredictable, then there would be a better case for televising such debates globally.

[26]The argument which could still be advanced in favor of such a proposal is that it might serve to increase global awareness and belongingness.

solution where people's daily cycle of work, sleep, etc., is not governed by light and dark but by the work habits of their counterparts in a dominant country.

It is hard to imagine that a major part of, say, the Norwegian population increasingly will work at night. A more likely outcome is that the distinction between leisure time and work time will be eroded for more and more people in the dominated countries—particularly for those in the service sectors which cater to an international market and in industries dominated by foreign interests.

3.6.2 Multilateral Control over Decision-Making

If control over decisions could be shared multilaterally, there might not be need for more than periodic consultation between the various centers. The example of the shipping organization suggests such a solution: when normal working hours close, all relevant information is transmitted to a point where the working-day is starting and from then decisions are made there until it's time to pass everything on to the next point, etc. The example discussed also suggests the problem with this procedure, however: the dominant center does not trust the other points to make the right decisions. They are therefore granted limited authority. Solving this problem is about equivalent to any other problem of real equality in organizations, no more, no less.

3.6.3 Move Everyone (Who Counts) to the Same Place

A curious aspect of the modern nation-state is the concurrent development of modern communications technology (which in theory should permit rapid and effective communication between all parts of the country) and concentration of population in a few great centers. If the same development occurred at the international level, it would certainly solve the problem of time differences. It is not that everybody has to move, only the people who want to be party to the decisions that are made at the international level.

3.6.4 Ignore Time Differences

While the problem of time differences still only affects a small part of the population, there is no necessity that it will spread to larger groups. A counter-culture may arise deciding to fight the kind of lifestyle which creates the problems discussed here. Such a counter-culture might prefer a certain reduction of material welfare if this meant less of a scarcity of time, a less hectic life, etc. The answer to the problem of time differences in this kind of culture would be: *so what?* A letter would be considered fast enough for non-personal communication and a ship would

be fast enough for travel. The perspective would then not be that of solving the problem of time differences, but that of actively fighting the life-style of the jet set.

Appendix: Correlation Matrix for Seven Measures of Distance and One Form of International Interaction

		1	2	3	4	5	6	7	8
1.	North–South distance	1.00	–	–	–	–	–	–	–
2.	East–West distance	0.08	1.00	–	–	–	–	–	–
3.	Great circle distance	0.35	0.90	1.00	–	–	–	–	–
4.	Climate similarity	–	−0.16	−0.07	−0.10	1.00	–	–	–
5.	Wealth difference	0.32	−0.01	−0.00	−0.12	1.00	–	–	–
6.	Travel fatigue	0.24	0.88	0.95	−0.09	−0.00	1.00	–	–
7.	Time difference	–	0.11	0.78	0.80	−0.07	−0.01	0.01	1.00
8.	Flights	−0.11	−0.11	−0.16	0.08	0.03	−0.13	−0.12	1.00

(n = 5,671)

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