

Occupational Safety Communication for Hazardous Goods: The Development of a Policy in Israel

Lewis H. Glinert

Dartmouth College, Hanover, NH, USA

Israeli policy governing written occupational safety information for carriage and supply of hazardous goods, and procedures for implementation, are described and evaluated for their potential communicative effectiveness, in view of users' linguistic abilities and the language employed. We also consider whether the addressee should include the end-user and the reading-impaired. The evaluation is set in the context of broader Israeli language policy, and comparison is made with communication policies for hazardous goods adopted by the European Union, the UK, and the USA.

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1. INTRODUCTION

This paper first examines Israeli regulations for the communication of written safety information to accompany the transportation and supply of hazardous goods for occupational use, and the procedures used in the implementation of such regulations. It then evaluates these policies for their communicative effectiveness, in view of users' linguistic abilities and the language and symbols employed. It also raises the question of whether the addressee should include the end-user and the reading-impaired. The evaluation

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Correspondence and requests for offprints should be sent to Lewis Glinert, 6191 Bartlett Hall, Dartmouth College, Hanover, NH 03755, USA. E-mail: <Lewis.H.Glinert@Dartmouth.edu>.

is set in the context of broader Israeli language policy, and comparison is made with communication policies for hazardous goods adopted by the European Union (EU), the UK, and the USA.

Israel is an advanced Third World economy, a Western-type, modern welfare state with a competitive free market system (Razin & Sadka 1993). In 1997 the International Monetary Fund promoted Israel—previously listed as a developing country—to its category of industrialized countries. The most recent United Nations' (UN) Human Development Index placed Israel 23rd out of 174 countries, coming in before Hong Kong, Greece, Portugal, and South Korea, among others. As such, Israel provides an interesting arena for studying the elements in the shift from a developing to a developed economy and society, and the interplay between these elements. Safety consciousness and promotion is a case in point. In terms of safeguarding the workplace, the Workers' Right to Know law of 1984 has helped bring Israel into line with Organization for Economic Co-Operation and Development states. On the other hand, an occupational safety official described to me as "sparse and outdated" the relevant Israel standards in force in the mid-1990s; and only recently have Israeli regulations for safety information on hazardous substances been brought into closer line with EU regulations.

Safety communication strategy is often governed in part by linguistic and cultural policies. Multilingual states are often faced with political and practical dilemmas in creating a workable safety communication policy. The case of Israel is particularly intriguing: This is a melting pot society built largely of over 3 million Jewish immigrants from diverse lands within 100 years, using a monolingual language policy to create a shared main language (Glinert, 1995; Spolsky, 1999)—while overcoming a unique problem: This language, Hebrew, was no one's mother tongue, and had not been a mother tongue for 2,000 years. At the same time, Israel recognizes Arabic as a joint official language and makes some allowances for it in the judicial and certain other domains (Glinert, 1996).

In the field of consumer protection, it has been noted (Delfino, 1996) that "legislation is quite advanced both in the E.C. and in Israel. In particular, it seems ... that each legal order may offer the other interesting legal models and experiences which deserve to be studied and compared (p. 2)." Meanwhile, however, compliance, enforcement and education are lagging behind. There is a relative weakness in the consumer lobby, in trade union pro-safety activity and in environmental consciousness and protection (Gabbay, 1994; Tal, in press), due in part to social and economic forces more typical of the developing world. Israel's first environment-oriented

political party, the Green Party, was only established in November 1997. Down to the 1980s a paternalistic attitude of “don’t panic the workers” generally prevailed. The Israel Ministry of the Environment (1995, p. 6), while hailing recent legislation controlling hazardous substances and an integrated national system for information and emergencies, has had to acknowledge: “Safe management of hazardous substances is one of Israel’s most pressing environmental concerns.”

At the same time, workers’ safety awareness is reported to be growing. Thus, Israeli National Insurance claims for occupational diseases are increasing annually—although far less than in Europe.¹

In recent years, the written communication of hazard has come increasingly to the attention of Western academics, business, and governments. Extensive legislation and creation of standards has been matched by extensive psychological and sociological testing on the effectiveness of labelling; the Human Factors Society of America and the Dutch Consumer Safety Institute are prominently associated with such work (Lehto & Papastravrou, 1993; *Safety Labelling*, 1995; Sattler, Lippy, & Jordan, 1997). Similarly, how best to classify, label, and educate for the hazards of the workplace is a priority at the UK’s Health and Safety Executive (HSE), where the past decade has seen a sea-change in the language and tone of codes of practice and popular information, attitudes embodied in the HSE’s recent guidelines (HSE, 1998) designed to help government departments and agencies improve dialogue on risk with the workforce.

How to harmonize communication on the hazards of chemicals is the subject of a current global initiative by the International Labour Organization (ILO). Following its “Report on the Size of the Task of Harmonizing Existing Systems of Classification and Labelling for Hazardous Chemicals” (ILO, 1992), initial steps have been taken towards harmonization in three areas (Revised Terms of Reference, p. 6), embracing transportation of chemicals and supply to the workplace and the consumer:

1. labelling, involving minimum data element requirements; graphic symbols; risk and safety phrases; comprehensibility;
2. chemical safety data sheets, involving data elements; format; phraseology and its comprehensibility; means of global dissemination;
3. training in hazard communication, including how to create training packages for compilers and users.

¹ I am indebted to Peter Magnus for this information.

The draft workplan of December 1994 proposes focusing in phase 1 on (a) comprehensibility of symbols and precautionary statements and (b) harmonization of chemical safety terminology. 1998–1999 was set as the target date for integration of labels, standard phrases, and other communications.

The European Community has been moving towards harmonization of standards in this as well as other areas, on the basis of Article 100A(3) of the amended Treaty of Rome (1986) and particularly as part of post-1992 economic unification.

In May 1995 the ILO issued a call to nongovernmental bodies to assist in collating existing information and research in this field, including the procedures used in the implementation of chemical hazard communication systems at the national level as well as by industry. This study is in part a response to this call.

2. SAFETY COMMUNICATION FOR HAZARDOUS GOODS

2.1. Issues and Policies Worldwide

The EU, the UK, and the USA provide examples of well-articulated regulations and codes of practice for carriage and supply of hazardous chemicals, including informational aspects.

The basic EU Directive, 67/548/EEC,² lays down for supply purposes (Article 6.2) that “the nature of the special risks involved in using the substances must be indicated by one or more of the standard phrases ... set out in Annex III to this Directive”, and (Article 6.3) “If the packaging is accompanied by advice on safety precautions relating to the use of the substances [this is not obligatory], the wording ... shall be taken from Annex IV...” In Annex III we find 84 risk phrases such as “explosive when dry,” “flammable liquid miscible with water,” “harmful substance if taken internally and if in contact with the skin,” whereas Annex IV lists 109 safety phrases, such as “Keep this material locked up” and “When using wear safety goggles.”

² Carriage of Dangerous Goods by Road Regulations 1996 (and accompanying regulations for rail and explosives), amended 1999. See “Are you involved in the carriage of dangerous goods by road or rail?,” HSE 1997, accessed at <http://www.hse.gov.uk/pubns/indg234.htm#12> on July 10, 2000.

More recently, in Commission Directive 91/155/EEC, the EU has legislated for the contents of material safety data sheets (MSDS), spelling out the hazards of dangerous chemicals and how to manage them. Regarding the communication aspect, the preamble talks blandly about “a clear, concise indication of the potential dangers” but with specific respect to first aid information the directive may be taken as implying that the reading level of the average person, if not of the less than average person, is to be taken into account: “The information on first aid must be brief and easy to understand by the victim, bystanders and first-aiders.”

Carriage is regulated by the European Directives on the carriage of dangerous goods by road and rail (the ADR³ and RID⁴ Framework Directives), amended in 2001 and 1999, respectively, based on UN Recommendations for the Transport of Dangerous Goods.

For the UK, the broad Health and Safety at Work Act 1974, Section 6, and the Classification, Packaging and Labelling of Dangerous Substances Regulations 1984 imposed upon manufacturers and suppliers of substances a duty to label and inform to ensure safe use, that is, the rudiments of a safety data sheet. Such information had to be made available to the workforce and its representatives, under the Management of Health and Safety at Work Regulations, but the regulations did not require the kind of detailed classification of chemicals or specific safety recommendations set out by the European Economic Community (EEC).

In response to these EEC directives on chemicals, the UK introduced the CHIP (Chemicals Hazard Information and Packaging) regulations—CHIP (1993) and CHIP 2 (1994 and subsequent amendments) regulations for carriage and supply, and their associated codes of practice. These regulations incorporate an Approved Supply List setting out EU-approved classification and technical labelling for several thousand dangerous substances; further information (safety data sheets) must also be supplied, describing, for example, the hazards the chemical may present, how it should be handled, stored, and disposed of and what should be done in the case of an accident (first aid, fire-fighting measures, and so on), and a set of standardized hazard phrases is prescribed. The CHIP Guide to Classification and Labelling

³ European Agreement concerning the International Carriage of Dangerous Goods by Road—ADR, ECE/TRANS/140 (amended July 2001) accessed at http://www.unece.org/trans/danger/publi/adr/adr_e.html on August 3, 2001.

⁴ International Regulations Concerning the Carriage of Dangerous Goods by Rail—RID, Appendix B to Consolidated Text of the Convention concerning International Carriage by Rail (COTIF), Central Office for International Carriage by Rail, Berne, 9 May 1980. Accessed at <http://www.unece.org/trade/cotif/Welcome.html> on August 3, 2001.

for Supply refers notably to the “general public” as well as “people at work”; labels must include (a) symbols and general indications of most severe hazards, (b) standard risk phrases, (c) standard safety phrases. The CHIP 2 Supply List recommends 64 such risk phrases and 62 safety phrases, to be given in full on labels.⁵ The CHIP 2 Code of Practice for safety data sheets enumerates the topics to be covered in a five-page appendix; while conceding that there is no obligation on employers to provide safety data sheets directly to employees, it states that safety data sheets should be regarded as open documents and made available directly or in gist to employees. Wording and presentation should be clear, concise and concrete.

Separate regulations for carriage⁶ based on UN Recommendations provide for danger signs, a substance identification number and an emergency action code (if allocated) of numbers and letters.

The equivalent American Federal regulation, the Hazard Communication Standard (1983, revised 1994) promulgated by OSHA (Occupational Safety and Health Administration),⁷ aims to “provide workers with the right to know the hazards and identities of the chemicals they are exposed to while working, as well as the measures they can take to protect themselves.” It focuses on training, labeling, and safety data sheets on chemicals, to be made available to employers, be they importers, manufacturers, or distributors, and by subsequent regulation, to all users (Baram, 1996). Like the EU and CHIP regulations, it is a “performance standard.” In Altvater’s (1990) words, “It suggests a format and describes the minimal information required, but it does not require that the end result be accurate or understandable to the average person” (p. 17). By OSHA’s (1995) own admission, it has attracted “substantial criticism, including that Material Safety Data Sheets are too long, too technical and too confusing,” and so new recommendations were commissioned, which called *inter alia* for OSHA to endorse American standard ANSI Z400.1⁸ (American National Standards Institute [ANSI], 1998).

⁵ An updated list is available at <http://www.hse.gov.uk/hthdir/noframes/chip/chip8.htm>. The Complete Idiot’s Guide to CHIP (May 1999) is available at <http://www.hse.gov.uk/pubns/indg181.pdf>.

⁶ Carriage of Dangerous Goods by Road Regulations 1996 (and accompanying regulations for rail and explosives), amended 1999. See “Are you involved in the carriage of dangerous goods by road or rail?,” HSE 1997, accessed at <http://www.hse.gov.uk/pubns/indg234.htm> 12 on July 10, 2000.

⁷ U.S. Federal Register No. 59:6126-6184. Summarized in a pamphlet entitled “Chemical Hazard Communication,” OSHA Publication Number 3084.

⁸ Report of the Hazard Communication Workgroup to the National Advisory Committee on Occupational Safety and Health (NACOSH), September 12, 1996, <http://www.osha-slc.gov/SLTC/hazardcommunications/wgfinal.html>.

American standard ANSI Z400.1 (ANSI, 1998) shows far more concern for the communicative aspects of data sheets. Here, as in its predecessor ANSI Z400.1 (1993), one can, in fact, sense the impact of recent empirical research on effectiveness of hazard communication.

Z400.1 states clearly (p. 1, *Scope and Purpose*) that the MSDS is intended for the broadest readership: “for chemical manufacturers’ employees, customers and their employees, health and safety professionals, fire departments, emergency responders ... and members of the community.” Thus, “wherever possible, MSDS information should be presented in language the layman can understand.” And putting it realistically, “One of the greatest challenges in preparing a MSDS is writing so that various audiences can read and understand the information. Reading levels of users vary widely.... The information being conveyed is often very technical.... An additional challenge is that the target audiences change from section to section. Therefore the reading level should change as well to adapt to the target audience. Word choice and sentence structure greatly affect reading level and comprehension.” At the same time, the standard recommends using text rather than unfamiliar pictograms. There follow several rules of thumb (p. 16):

Choose commonly used, familiar words, but avoid colloquialisms or slang.

Keep sentences short and direct. Use no more than two subordinate clauses. Use active voice as much as possible, e.g. ‘Acid causes skin burns’.

Sentences that include a long string of items can be made clearer by putting them into a list.

When technical language is necessary in sections targeted for nontechnical audiences, it is advisable to also include a less technical explanation.

Annexed to Z400.1 is a suggested list of at least 300 commonly used risk phrases (a few of which are marked as passing a comprehension test for workers), for example, “Impact or high temperatures can cause violent decomposition,” “Contact with (specify material) may form shock sensitive mixtures.”

The international standard No. ISO 11014 (International Organization for Standardization [ISO], 1994), Safety Data Sheet for Chemical Products, portrays itself as following, inter alia, the model of the EEC directives. Safety Data Sheets are deemed primarily to be a communication between supplier and “recipient,” that is, “a party receiving a chemical product for

industrial or professional use,” as against the end user: “The recipient of an SDS is responsible for choosing the appropriate way of informing the users. When formulating the specific instructions for the workplace, the recipient should consider the general recommendations of relevant SDSs.” The only exception concerning the end user is for accident victims: Information on first-aid measures “should be easily understandable by the victim and/or the first-aider.” (There is no reference to by-standers as in 91/155/EEC.) The only other references to discourse are bland: “An SDS should be in a language acceptable to the recipient ... in a clear and concise manner.” Unlike the EU directives, it proposes no risk or safety phrases, not even as recommendations.

2.2. The Development of a Policy in Israel

Israeli regulations and recommendations for communicating about hazardous goods are in some respects well developed, particular when viewed relatively to Israel’s 50-odd years as a sovereign state. In other respects, however, they are still in the early stages of evolution. The general tendency is to follow the EU rather than the USA, because of trade factors: As of 1999, 52% of Israel’s imports are from the EU and European Free Trade Association (EFTA) and just 21% from North America (Israel Ministry of Industry and Trade Statistics). Thus, Israeli standards for occupational warning signs are generally based on the ISO and British Standards.⁹

2.2.1. Carriage

Since 1978 the Israeli regulations on transportation of hazardous substances (the Directive on Products and Services [Carriage and Towing], 1978) have nominally been based in the main on the UN *Recommendations on the Transport of Dangerous Goods*, though in recent years certain aspects of the ADR Agreement have been adopted. Seventeen carriage warning signs are prescribed. These involve Hebrew, English, and Arabic wording (such as “inflammable liquid,” “spontaneously combustible”) and a symbol. The use of all three languages, otherwise rare in official communications (Glinert, 1996), indicates the importance attached to these signs, although they are

⁹ This information is due to Mr C. Marion of the Israel Standards Institute. See, for example, ISO 3894 *Safety colours and safety signs* and BS 5378 Pt. 1 *Safety signs and colours*.

clearly meant for trained Hebrew-literate personnel. (We shall return to the question of official languages.)

Beyond these warning signs, the 1978 ordinance on transportation of hazardous chemicals (schedule 3) requires the carrier to carry an emergency card serving (a) to identify the chemical (name, technical name, UN number and emergency code, danger group), (b) to identify the hazard, (c) to specify safety measures in the event of accidents, (d) to provide emergency telephone numbers.

Managements go by the UN book, only a miniscule part of which has been rendered into Hebrew. The Israel Institute for Occupational Safety and Hygiene (IOSH) is currently charged with the task, but according to one of the officials involved the problem is compounded by the need to couch the UN regulations in a simple Hebrew understood by management and workforce alike. Such concern with creating a “simple Hebrew” is still a rarity in our experience, but it may be the harbinger of a new degree of communicative consciousness in Israel.

In 1997 the Israeli Parliament passed the Transport Services Law, which deals, among other things, with dangerous substances. It has formally now entered into force, but it is on hold at time of writing, pending publication of new accompanying Ministry of Transport regulations on the transport of dangerous substances, which are to replace the 1978 ordinance just mentioned.

2.2.2. Supply

It was not until 1998 that Israel legislated for hazardous chemical supply information, a situation that seems to have reflected the profile of occupational safety in Israel. Thus, we were informed that the number of Ministry of Labour safety inspectors in Israel was proportionately far below that in the EU and that their speciality is safety hygiene rather than chemicals. Maybe not unrelated to this, a Tazpit survey of 1989 found that 57% of a sample of the public blamed the negligence of the workforce for accidents at work and only 31% blamed management. Maintaining Material Data Safety Sheets was until recently a voluntary exercise, and, in the opinion of one Ministry of Labour official, “this did not work very well.” Large plants sometimes had their own simplified regulations, and some manufacturers maintained first-rate MSDS, but there was no Code of Practice or Israeli Supply List to compare, say, with the British CHIP. In practice, where regulations were lacking, management and workforce simply had to consult the IOSH, which has endeavoured to create and

disseminate simplified versions of a range of safety regulations (including some with Arabic translation), as part of its training role.

In 1998, however, new Ministry of Labour and Environment Ministry regulations for MSDS were published. An Israeli Standard No. 2302 (Standards Institution of Israel, 1998) had meanwhile been introduced and the newly enacted MSDS regulations adopted sections from the standards, concerning the quality of packaging, marking, and labelling. All of them mainly follow the UN guidance.

2.2.3. The new regulations

The new regulations include a requirement that hazardous substances when supplied be accompanied by MSDS and signs, on an ISO and EU model. The regulations are to be binding for manufacturers, importers, and employers. These laws are a joint endeavour of the Ministry of Labour and the relatively new Ministry of the Environment, a token of a wind of change in Israeli occupational safety. (None of this applies to agricultural or medicinal substances, or to household preparations with legal safety warnings. Note that carriage of hazardous substances as a whole is governed by Ministry of Transport regulations, not those of the Ministries of Labour or the Environment.)

The regulations require that safety and risk phrases henceforth appear on packaging, in Hebrew, giving essential hazards plus the means for protection of workers. These are taken from the aforementioned Israeli Standard, based on EU Directive 67/548/EEC. (This standard is itself now under revision.)

By contrast, the MSDS can be in either English or Hebrew. Any manufacturer, importer, or seller supplying hazardous substances, and anyone keeping them, must possess an MSDS, “to safeguard the health and safety of employees and the environment.” The MSDS must refer to the substance, the risks, First Aid, firefighting, safety measures, storage, toxicity, carriage, and disposal. Writers of MSDS are permitted to base themselves on Standards No. ISO 11014 (ISO, 1994) or Commission Directive 91/155/EEC, or other similar standards.

Schedule 4a of the law enumerates Guidelines for Preparing MSDS. To give an idea of the scope of these guidelines: Authors of first aid information must [my translation]

1. Describe all essential First Aid actions. Instructions should be brief and clear, to be understandable to the victim, bystanders, and first-aiders.
2. Make it clear whether First Aid is to be summoned immediately and what actions are prohibited.

3. Briefly describe the main symptoms anticipated, both immediate and delayed.

In addition,

4. Information should be organized, according to order of exposure to the hazardous substance, under these headings: inhalation, skin contact, eye contact, swallowing;
and where necessary, they must specify
5. Protective measures for first-aiders and remarks for the physician.
6. Special measures to be held in the workplace for giving urgent specialized treatment.

3. HAZARD COMMUNICATION ISSUES IN AN ISRAELI CONTEXT

The Israeli regulations and guidelines raise a number of communications issues.

3.1. Who Is the User?

MSDS used in Israel are permitted to base themselves on Standard No. ISO 11014 (ISO, 1994), which deems the MSDS primarily a communication between supplier and recipient, as against the end user. However, increasing attention is being drawn to the implications of Right to Know legislation (Morse, 1998). As Altvater (1990) has observed, “the user community is by far the main group affected by hazardous chemicals and MSDS’s.”

3.2. Should Hebrew Be a Required Language of Risk?

It is striking that the legislation would permit the use of either English or Hebrew. Presumably, existing English-language MSDS descriptions of physicochemical properties, storage, and disposal methods and so forth will be adopted wholesale. However, competence in written or technical English is far from satisfactory in Israel, even among Israeli-educated graduates, let alone among recent immigrants from the former USSR. (No reliable figures are available.) Nevertheless, one Ministry of Labour official robustly

defended the decision: “We are confident that safety personnel know enough English to deal with this. And an inaccurate Hebrew translation would be more risk than it’s worth.” And, in the same interview: “We don’t want to make things too difficult.” Apparently, a compromise has had to be made, through the old lack of resources or lack of communicative awareness, or both—an unhappy state of affairs, particularly as the storer and employer must brief workers on the contents of the MSDS and provide copies on demand. (The UK code of practice for safety data sheets [*Approved Code of Practice*, 1994] states that they should be regarded as “open documents.”)

Here is the crunch. The communicative chain is only as strong as its weakest link, and if a crucial element in the communication of hazards is to inform the general workforce of precautions that they themselves must take and of responses they must make to accidents, it is clearly essential for management to receive training in both formal and colloquial channels of safety discourse in the Hebrew vernacular. (It is already the case that the regulations for Agricultural Machinery and for Tower Cranes require instructions to be translated into Hebrew.)

Even if a comprehensive, consistent, and self-explanatory Hebrew phraseology for labelling hazardous chemicals does exist, the task of training personnel to apply and interpret it correctly is quite another matter. The problems faced by British personnel in the 1980s and highlighted by White (1991)—a labyrinth of requirements, “no comprehensive, authoritative training” for labellers, whereas “the majority of recipients are not capable of identifying a defective label” (p. 15)—is compounded for Israeli suppliers and recipients, for whom English is not a first language. (I am unaware of any fieldwork on understanding of chemical labelling by Israeli employees.)

3.3. Using Israeli Minority Languages

The legislation makes no mention of Arabic or any other language, despite the fact that a sizeable part of the workforce is not Hebrew-literate. Furthermore, Israel had an estimated 79,000 illegal foreign labourers in 1999, aside from 67,000 legal guest workers from countries such as Romania and Thailand (Ministry of Labor and Social Welfare figures, *Jerusalem Post*, February 10, 2000, p. 13). It is unclear how far this is due to practical difficulties—size of labels, availability of translations—or to Israel’s broad monolingual policies as a country founded on mass immigration.

We were reminded by officials that legislation on Workers' Right to Know requires employers to train their workers in safety matters, and includes (Article 6) a requirement to provide workers with written summaries of hazard information in Hebrew or Arabic, as required, and with an oral explanation in whatever may be their mother tongue but this may be relatively ineffective in small plants and cannot, in any event, take the place of adequate labelling. The law makes no mention of specific language provisions for signs and labelling of dangerous equipment; Ministry officials stated that there are no plans to require Arabic or any other minority language. There is, however, a precedent for using a minority language: The Construction Safety Regulations 1992 were published with a Russian translation, though not with Arabic—for reasons that were not made clear to us. (It is probable that this use of Russian was simply the result of one department's individual enterprise. There is widespread use of Russian in Israel on the basis of individual and individualistic initiative in official contacts with the public [Glinert, 1995].) A Ministry official suggested to us that many highly-skilled Soviet immigrants, compelled to take up blue-collar jobs, had been too embarrassed to admit that they did not understand the machinery, and in the absence of Russian explanatory literature there had been many injuries. Attempts had been made to translate the essentials, but the State could not cope with the amount of material.

3.4. Making Communication Effective: Some Basic Imperatives

Most fundamental, the duty to inform the workforce raises questions of communicative effectiveness and compliance. Guidelines for enhancing health risk communications published by the American NIOSH (National Institute for Occupational Safety and Health) and cited in Cohen, Colligan, and Berger (1985) recommend that safety messages (a) be integrated into general safety training, (b) be suited to the recipient and the circumstances, (c) balance mention of risk with risk-reduction, (d) use an interesting and easy style, (e) be repeated at intervals and through a variety of channels, (f) undergo regular assessment and revision.

Applying the NIOSH guidelines to American MSDS, Cohen, Schmitt, and Colligan (1989) observe that "the typical MSDS by itself is a poor means of informing workers of hazards. First, much of the technical data has no meaning to the average worker and can frustrate their reading of other portions which are more pertinent to hazard recognition and safe

practices but which tend to come later in the document. [Altwater, 1990, comments that ‘the new computer-generated MSDS reports are so complicated and technical that they require a toxicologist for interpretation,’ p. 17]. Second, depictions of hazardous conditions, signs or symptoms of exposure, safe handling procedures are written generically and thus workers may see little connection between their use of the chemical and the information supplied.” Thus, Kolp, Sattler, Blayney, and Sherwood (1993) found information on the MSDSs to be about one third incomprehensible to a group of unionized workers. Just the readability levels themselves are problematic: Szudy and Arroyo (1994) found that 25 health and safety materials prepared by U.S. government agencies, unions, worker educators, and private safety companies required on average a college reading level. Cohen et al. (1989) recommend that “the MSDS should be used as a basis for generating more ‘reader-friendly’ messages to workers” (p. 10)—and via training sessions, notices, audio and video, using management, foremen, safety committees, newsletters, and any other conceivable means. But as they concede, their own field trials using more reader-friendly written sheets made very little difference in themselves; live training and demonstrations and audio-video techniques may be the only way of informing and of affecting actual behaviour. (On the promising effect of behavioural modelling and of video, see Racicot & Wogalter, 1995.)

The Israeli regulations and guidelines for MSDS—with the exception of first aid information—miss an opportunity to implement current progressive thinking. No demands are made for the Hebrew being used to be simple and straightforward, in terms of language, tone, and format. Nor is expression given to the broader communicative and compliance concerns that we have singled out in the American NIOSH guidelines and other reports critical of the Federal OSHA communication standard.

3.5. Impaired Literacy and the Concept of the Average Person

The composition of the Israeli workforce and the cultural-linguistic situation in Israel serve to focus attention on matters that may sometimes go unnoticed in a Western setting. Hebrew semiliteracy is a serious problem in a society like Israel with a high proportion of immigrants and linguistic minorities. Thus, Rosenbaum (1983, p. 120), studying a sample 2,880 immigrants who arrived in 1970–1972, largely from the USSR, found that “after three years in the country, about one fifth still could not speak Hebrew

at all, almost 40% made no use at all of Hebrew as a language of everyday life, about a third heard no radio news in Hebrew, and about 70% read no Hebrew newspapers.” Even over the longer term, Hofman and Fisherman’s (1972, pp. 360ff) sample of Rumanian immigrants found that, for those of 3 to 6 years’ standing, between 48 and 73% had poor to zero literacy, whereas for those of 20 years’ standing between 64 and 71% rated poor to zero.

In the absence of census data and large-scale surveys, one must rely on smaller studies, as evaluated in Glinert (1996). The UNESCO Institute for Statistics (<http://www.un.org/Depts/unsd/social/literacy.htm>, accessed on August 7, 2000) gives an adult (15+) illiteracy figure for Israel of 2.1% for men and 5.8% for women. However, this includes literacy in an immigrant or minority mother tongue rather than Hebrew literacy.

Concerted measures of simplified Hebrew are clearly imperative. These could be modelled on well-trying notions of Plain English (Redish, 1983; Steinberg, 1991), now given U.S. government endorsement (*Plain Language in Government Writing, 1998*).

A contributory factor is the Hebrew spelling system (Rabin, 1983). Throughout the years, little effort has been committed to simplifying Hebrew’s daunting orthography, which rather resembles speedwriting in omitting a large proportion of vowels. (New immigrants and children are usually taught a spelling that marks all the vowels by inserting dots and dashes, but this is rarely found in ordinary texts.) Standard spelling is “semivocalized,” that is, several of the vowels are not regularly indicated, causing much potential ambiguity and significantly slowing the decoding process for the semiliterate. Whereas perfectly adequate for native-Hebrew-speaking adults, semivocalized spelling poses serious problems to immigrants, who form a sizable part of the population. For example, some 800,000 Soviet immigrants arrived in the 1990s, constituting some 15% of Israel’s Jewish population (The Israel Statistical Yearbook, 2000). An example of the problems that may thus be caused is the term *homer me’akel* for “corrosive substance” a standard label in the Israeli carriage list; in the absence of vowel marks, *me’akel* is liable to be read as *ma’akhal* “edible.” Moreover, the very word is arcane: *korosivi* is the usual everyday word. Ironically, an official in the Labor Ministry blamed the Academy of the Hebrew Language (the legal arbiters on official terminology) for insisting on *me’akel* as more “authentic.” In actual fact, the Academy has long recommended another word entirely, equally arcane, to denote “corrosive.”

Safety communication regulations in the USA and the EU have usually targeted the average person. In the words of Sattler et al. (1997), section

3.2.1, “Literacy and language issues have not been substantially explored regarding hazard communication”—this despite the fact that an estimated one third of the U.S. workforce reads at or below eighth-grade reading level. However, measures to assist those with impaired literacy have been advocated by Szudy and Arroyo (1994) and—for the consumer—by Múgica (1990) and Darnbrough (1996). Smith (1995) has advocated comparable measures for the semiliterate majorities in less developed countries. The arguments of such consumer advocates are instructive for occupational communications, particularly where they base themselves on an interpretation of legislation.

The wording of EEC Directive 85/374 on product liability has prompted Múgica (1990) to suggest that “if the typical user of a certain product includes a group of weak consumers [‘children, the elderly, people in lower income brackets and people with insufficient basic education or without knowledge of the language of their home country’], the producer must specify the safety level of the product to meet their specific needs” (p. 304). Poor sight might entitle many millions to special labelling provisions under EU directives referring to “consumers” in general. In Darnbrough’s (1996) view, an estimated 6 million visually impaired EU citizens and many more millions elderly people with visual difficulties are in this category. And indeed, Directives 90/35/EEC and 91/410/EEC already provide for tactile danger warnings for the visually impaired on a range of household chemicals. Safety of children and the elderly is already given priority in Norwegian legislation, as described by Ringstedt (1992). A comparable issue is the debate, notably in the USA, over adoption of a “reasonable” as against a “credulous” standard of behaviour in deeming advertising to be misleading (Ramsay, 1993).

The use of symbols in place of text is not in itself a solution, in Israel or elsewhere. Although ISO Guide 37 (ISO, 1995, §9) recommends that “where appropriate, the use of standardized phrases, and/or safety signs or graphical symbols should be considered in order to convey important messages such as warning notices. Such phrases and signs should be specified in the relevant product standards,” Lehto and Miller (1988), Akerboom and Trommelen (1998) and others have demonstrated the poor comprehensibility of symbols, when not accompanied by text and other contextual cues. Indeed, certain societies fare particularly poorly with symbols.

This said, the effectiveness of texts or symbols and compliance with them is subject to a range of other, nonlinguistic factors. Here, consumer education plays a key role; and the methods used will have to reflect the

fact that most of those with poor Hebrew literacy are highly literate in their own mother tongue.

4. CONCLUSIONS

It might be argued that it is not the function of regulations to address the needs of end-users, be they perfectly literate or semiliterate, and that it is for safety and health firms to reap profits from helping users interpret the hazards. Indeed, the American legislative situation at the end of the 1980s would appear to support this view—if one chooses to derive an “ought” from an “is.” In Altvater’s (1990) words, “Current Right-to-Know regulations place great emphasis on the development, generation and distribution of the MSDS report, as well as on training how to read or interpret the information. However, there are no regulations dealing with accuracy, completeness and clarity of MSDS information, and it is these areas that cause major user problems” (p. 17). It has proved hard enough getting suppliers to fill in existing MSDSs adequately; a Seattle survey of 476 MSDSs found that only 3% had all required elements present (“Material Safety Data Sheets,” 1986). Viewed from this perspective, the situation in Israel compares well with that of other developed societies.

Nonetheless, there are grounds for believing that a radical change in the safety communications ethos is occurring in Western countries, due to a constellation—fortuitous or otherwise—of disparate factors: Right to Know legislation; mounting concern about liability; the drive for harmonization and for ISO 9000 status; new awareness of language rights; a linguistic and rhetorical down-shift towards a more popular tone right across the board (in literature, the media, official communication); new linguistic insight into popular registers and what it takes to create a plain and popular written version of these, and so on.

All these progressive factors are active, to a greater or lesser extent, in Israel today, embodied most clearly in a ministry of the environment, created in 1992. Linguistically, the Israel Ministry of Education has begun implementing radically pluralistic policies (Glinert, 1995, pp. 356–358), mapped out in part by Israel’s first Centre for Language Policy, established in 1995 at Bar Ilan University. There is therefore good reason for recommendations to be made for the enhancement of written hazard communication for industrial chemicals.

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