Engineering Psychology
Prof. Naveen Kashyap
Department of Humanities and Social Sciences
Indian Institute of Technology, Guwahati
Week-08
Lecture-20
Human error - 2

Namaskar. Welcome back to this second series of lectures on human errors. In the previous class, I explained what human error is by creating a fictitious profile and vignette to illustrate how errors can occur. I also discussed the different types of errors, ranging from output errors, specifically, commission and omission errors, to classifications of errors within a cognitive framework.

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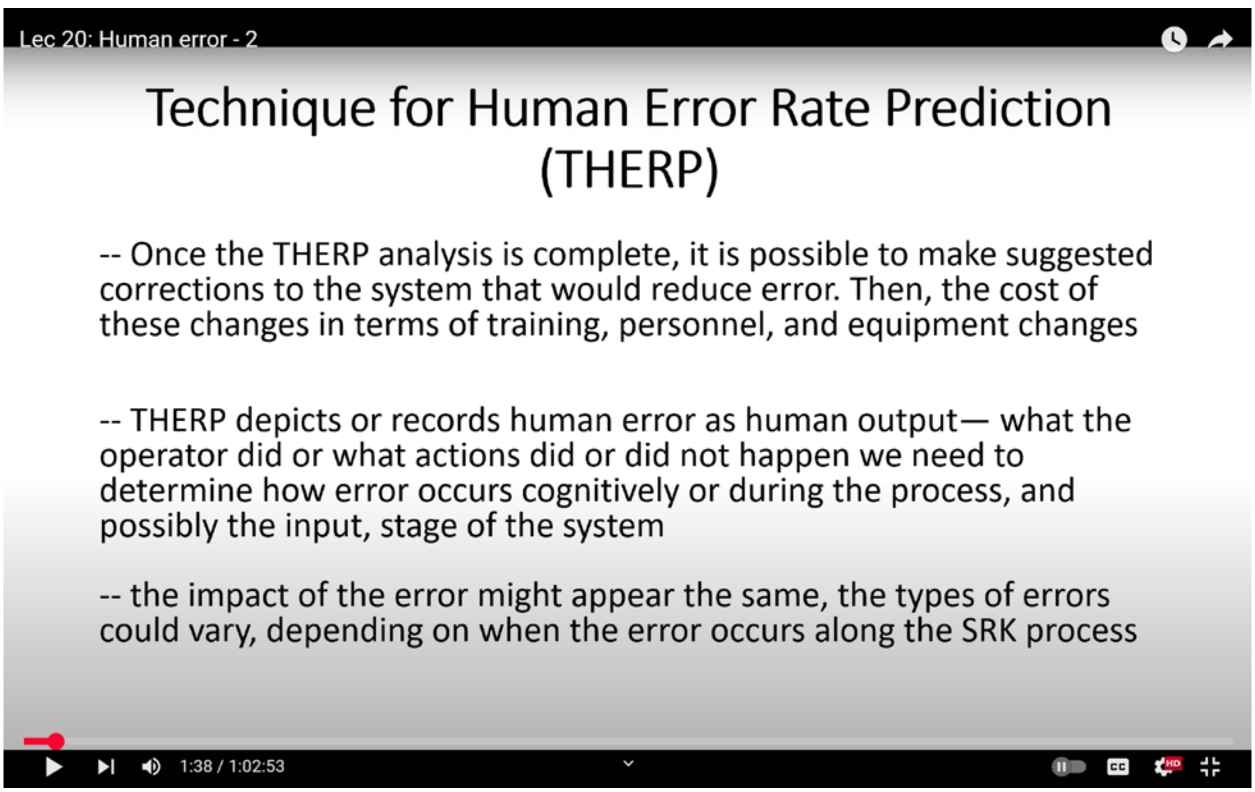

We explored the concepts of slips and mistakes, emphasizing the cognitive basis for errors. Additionally, I introduced the Skill, Rule, Knowledge (SRK) paradigm for classifying errors.

Toward the end of the lecture, I discussed human reliability and the steps involved in conducting a human reliability analysis (HRA). I explained that the analysis begins by identifying potential locations where errors can occur, predicting certain types of errors, adding the probabilities of these errors, and ultimately calculating a probability coefficient for specific types of errors that may arise during task performance.

We also covered how to apply the THERP (Technique for Human Error Rate Prediction) model to study errors. Today's lecture aims to continue our exploration of errors, introduce additional classification systems for errors, and propose solutions to reduce human errors. Human errors can occur due to unconscious efforts or conscious decisions. In the story I shared at the beginning of the lecture, I demonstrated how these two types of errors can be classified.

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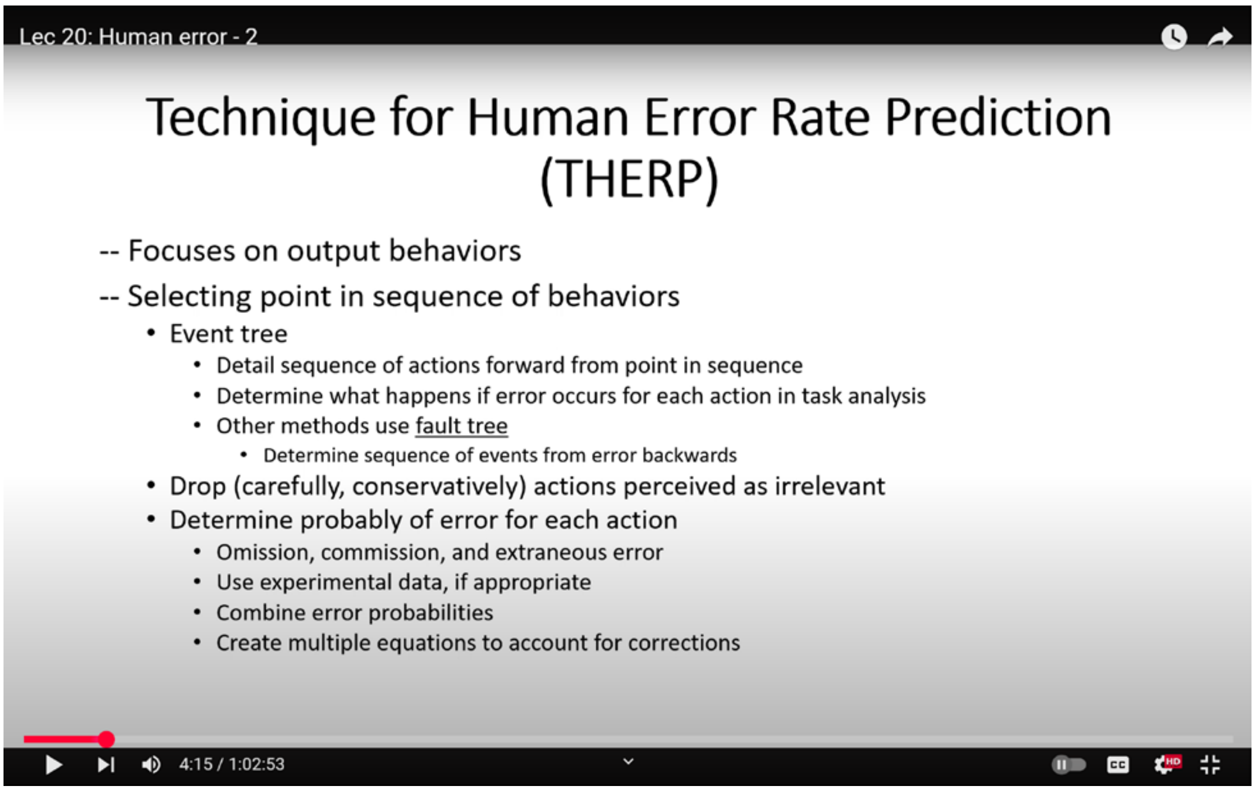

To provide a brief summary of THERP, I will outline the steps of the THERP model. The model begins by examining output behaviors. It investigates what types of human outputs result from a specific input supplied by the system and how these outputs can lead to errors. Once I can classify and pinpoint an error, I select a specific point in the sequence of behavior where the error occurred. For example, in the case of a car breakdown during a snowstorm, there could be multiple contributing factors. These could include environmental conditions or user-related factors such as monitoring lapses, insufficient sleep, or other personal issues, as well as potential failures in the brake system.

Assuming we are focusing on the brake system, we can explore the possible reasons for its failure. If it is established that the brake system is the cause of the failure, we can investigate why it failed. Possible reasons could include a lack of testing or testing that revealed insufficient friction, among other causes.

Starting from the point where the failure occurred, we create an event tree, which is a detailed sequence of actions following the point of error. This event tree illustrates what happens if an error occurs at each action identified in the task analysis. We perform a task analysis to identify all the potential reasons for the brake failure, from which we determine the error rate.

Alternatively, we can utilize a fault tree. In contrast to the event tree, which moves forward from the error point to explore all possible paths, the fault tree moves backward from all potential actions to identify the error. This approach is directionally opposite to that of the event tree. We then eliminate those actions that could not have contributed to the error. For instance, in our example of a car accident during a snowstorm, if we know that the driver did not experience any performance deficits and that the storm conditions were manageable, we can rule out these factors as reasons for the error.

Thus, we carefully and conservatively examine the actions that have a lower likelihood of being considered as contributing factors to the error. After completing this analysis, we determine the probability of error for each action, whether it involves omission, commission, or extraneous factors. We can employ experimental data to understand why the brake failure occurred and subsequently led to the accident. By combining the various probabilities from different actions, we create multiple equations to account for potential corrections.

We discussed these points in the previous lecture, and I was merely summarizing the THERP method. Additionally, we can integrate GEMS (Generic Error Modeling System) with HRA.

GEMS is not only beneficial for classifying errors but also for conducting human reliability analysis. It captures the cognitive aspects of human error by incorporating the SRK model to explain normal slips and mistakes. GEMS also helps elucidate when an appropriate operator is likely to transition into rule-based or knowledge-based systems.

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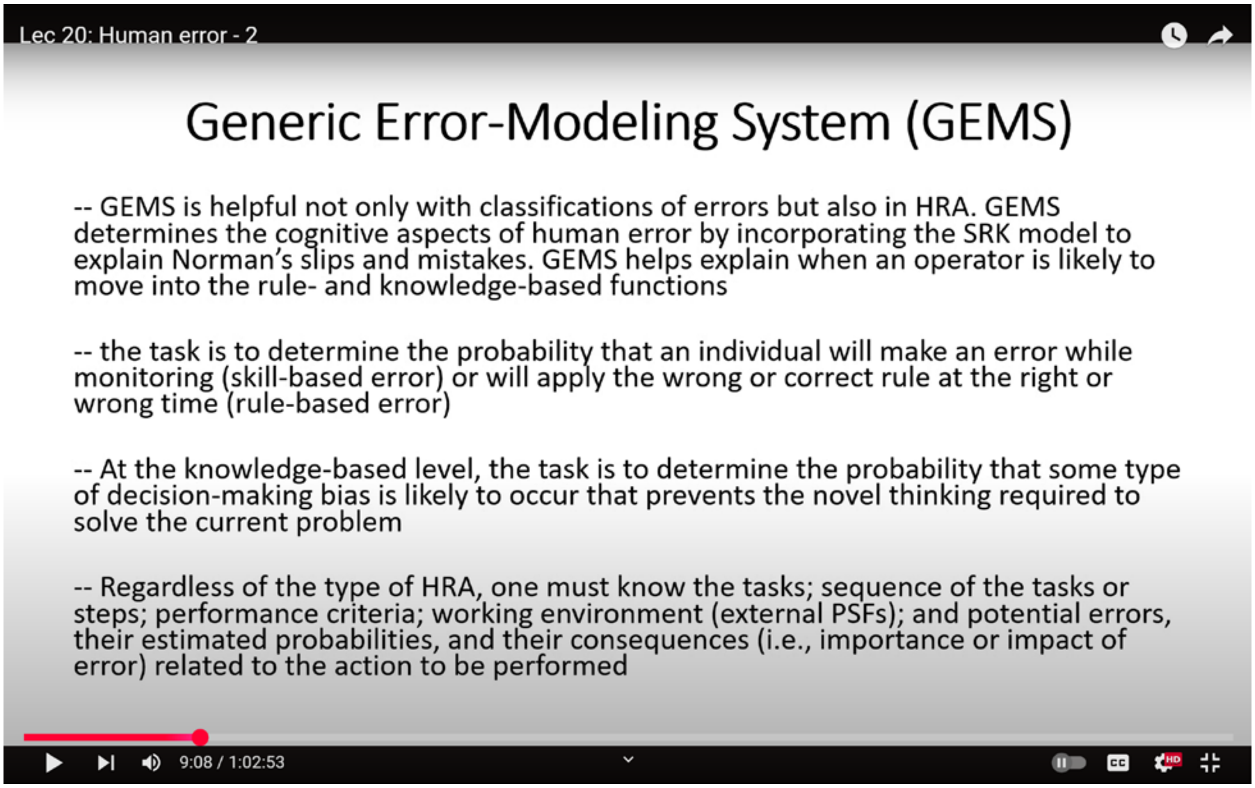

By incorporating predictions from the Generic Error Monitoring (GEM) system, we can uncover the cognitive reasons behind errors. When an individual transitions from automatic skill-based behavior to knowledge-based or rule-based behavior, this shift can be identified through GEM. By examining these transitions, we can ascertain the reasons for the error. Was it simply a lapse on the part of the operator, or was it a mistake, a more conscious action that resulted from a flawed mental model? Such analyses are crucial.

The objective of using GEM in Human Reliability Analysis (HRA) is to determine the probability that an individual will make an error. This includes monitoring skill-based errors or applying the wrong or correct rule at the appropriate or inappropriate time, which constitutes rule-based errors.

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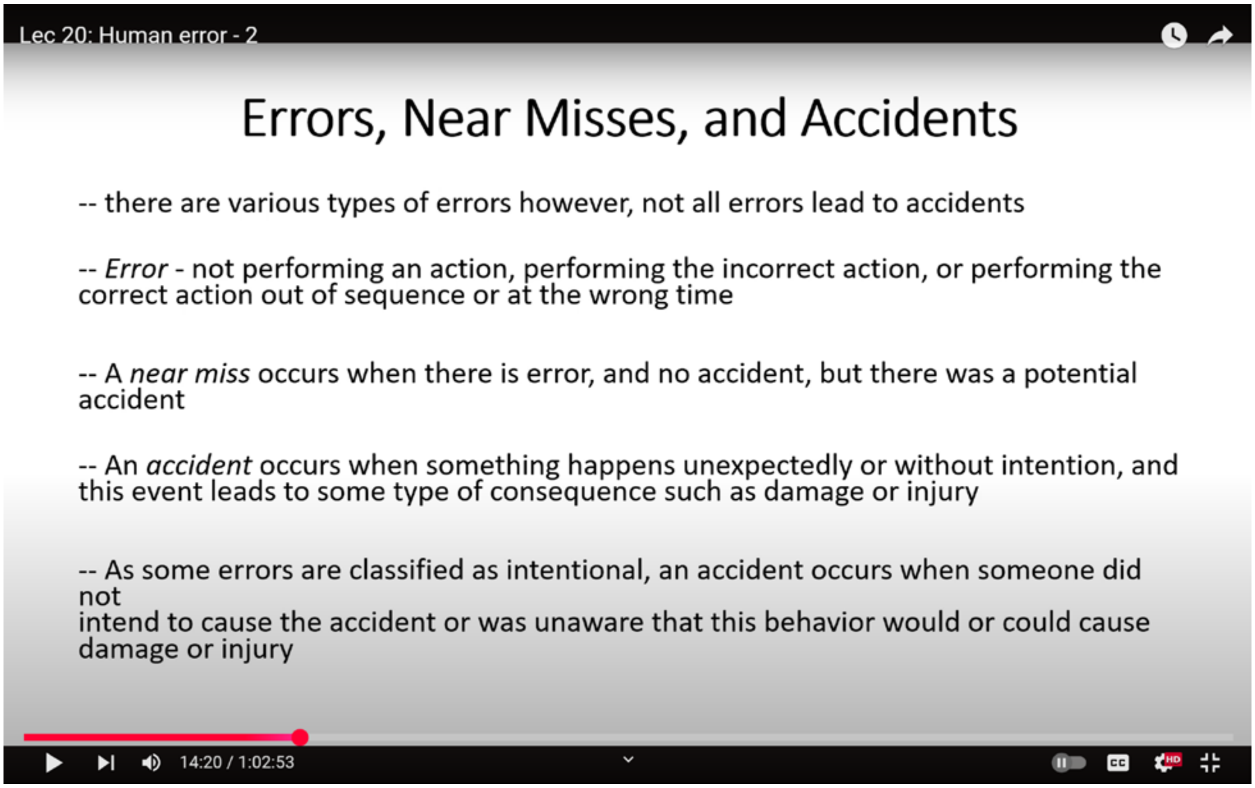

It is important to identify whether the error occurred due to rule-based or skill-based reasons. At the knowledge-based level, the task is to assess the probability of certain decision-making biases that might inhibit the innovative thinking required to address the current problem. Another possible reason for the error could be flawed decision-making on the part of the human operator, leading to the error's occurrence. If an error does occur, we can predict it using the THERP model. A competent human analyst can then use GEM to identify the possible reasons and cognitive factors that contributed to the operator's error.

Regardless of the type of HRA, it is essential to understand the task, the sequence of task steps, the performance criteria, the working environment, and the potential errors related to estimated probabilities and their consequences. Thus, when utilizing GEM with HRA, we must examine how the task was performed, the sequence of task execution, the criteria for task performance, environmental factors, the types of errors that may occur, and their associated probabilities. Following an error, we must also consider the consequences: Was it an accident, or was it a near miss? All these elements combine to provide insight into the cognitive processes of the operator and the underlying basis for errors.

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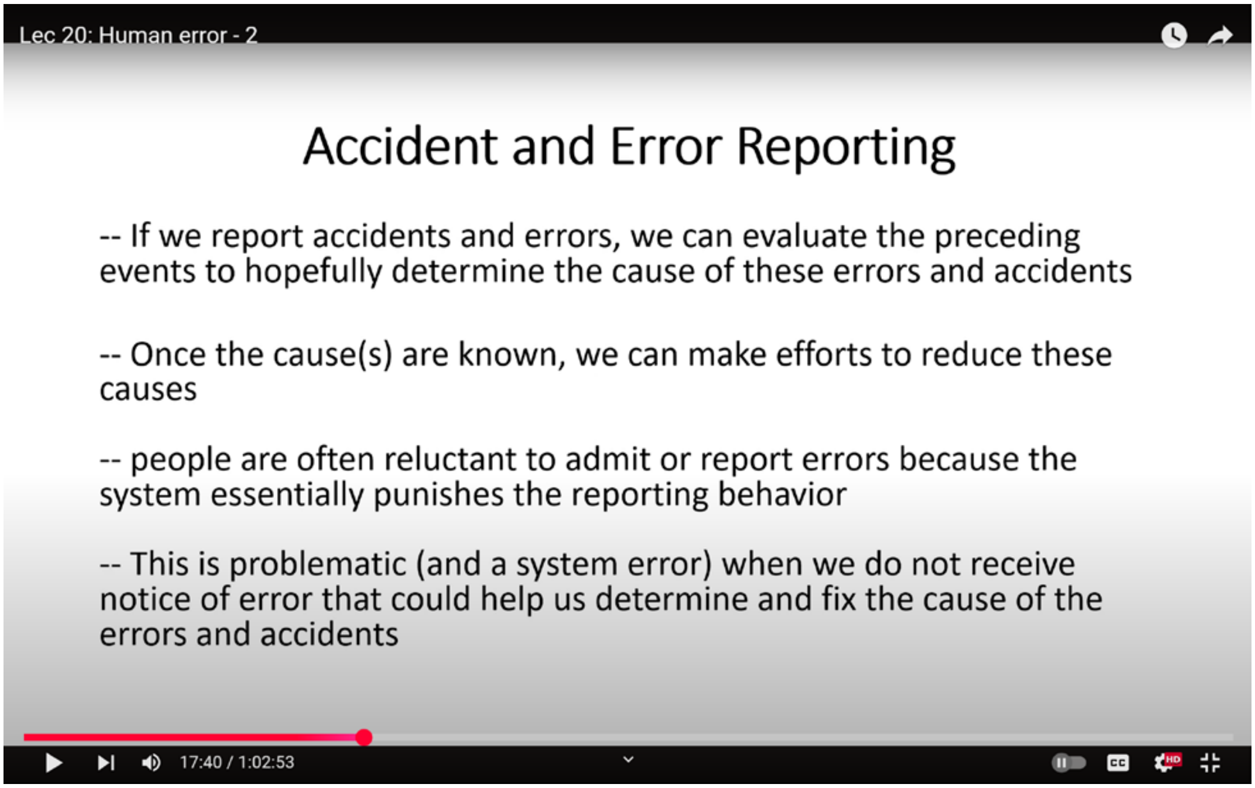

Assuming that an error has occurred, two outcomes are possible: an accident may result, leading to loss of life or property, or there could be a near miss, indicating a situation close to an accident that was avoided through some intervention. Let's explore these possibilities.

There are various types of errors, but not all of them result in accidents. An error can be defined as a non-performing action, performing an incorrect action, or executing a correct action out of sequence or at the wrong time. Errors might manifest as failing to take action, considered a slip, or performing the wrong action, referred to as a commission error. Not taking an action could also be classified as an omission error, while performing a correct action out of sequence or at the wrong time is again a commission error. Therefore, errors can manifest as either slips or mistakes, with a mistake representing a flawed action and a slip indicating the failure to perform an action.

Errors can lead to either a near miss or an accident. A near miss occurs when an error is made, but no accident ensues, despite the potential for one. For example, if I reach for an object on a table without watching where my hand is going, I may accidentally knock over a glass of water. Realizing my mistake, I catch the glass before it falls to the floor, thereby preventing an accident that would have resulted in breaking the glass and spilling water. This scenario illustrates a near miss.

In contrast, an accident occurs when an unexpected or unintended event leads to some form of consequence, such as damage or injury. Accidents typically result in injuries or adverse outcomes. Some errors may be classified as intentional; however, an accident occurs when an individual does not intend to cause harm and is unaware that their behavior could lead to damage or injury. Consequently, accidents are never intentional; they arise from actions that inadvertently result in injury or loss.

When an accident or near miss occurs, the immediate goal of the operator should be to report the incident. However, we often find that most people do not report accidents. Why does this happen? What benefits does accident reporting provide? Reporting an accident allows us to evaluate the events leading up to it in hopes of identifying the underlying causes of errors and accidents. If an accident is reported, we can uncover its cause, as analysts will be able to track both desirable and undesirable behaviors. The system can then identify the reasons behind the accident.

Once the causes are understood, we can work to mitigate them. By determining why an accident occurred, we can devise solutions to prevent similar incidents in the future. People often hesitate to admit or report errors because the system may penalize such reporting behavior. In daily life, individuals may refrain from reporting accidents, fearing that doing so could result in negative consequences, such as having their license revoked, incurring fines, or facing other forms of punishment.

This reluctance to report accidents presents a systemic error, as we miss crucial information that could help us identify and address the causes of errors and accidents. Without reporting these incidents, we remain unaware of their origins, which is problematic. Therefore, it is advisable to report accidents, as doing so will provide valuable data for analysts to understand why accidents happen and how to prevent them in the future.

By analyzing the nature of the errors that lead to accidents, we can devise a better system design aimed at minimizing these errors. So, what exactly is error detection and correction? Various methods for reducing errors include self-monitoring and double-checking. One effective way to minimize errors, particularly lapses and slip-based errors, is through self-monitoring. By consistently double-checking and monitoring our behavior, we can identify actions that may lead to errors or further complications.

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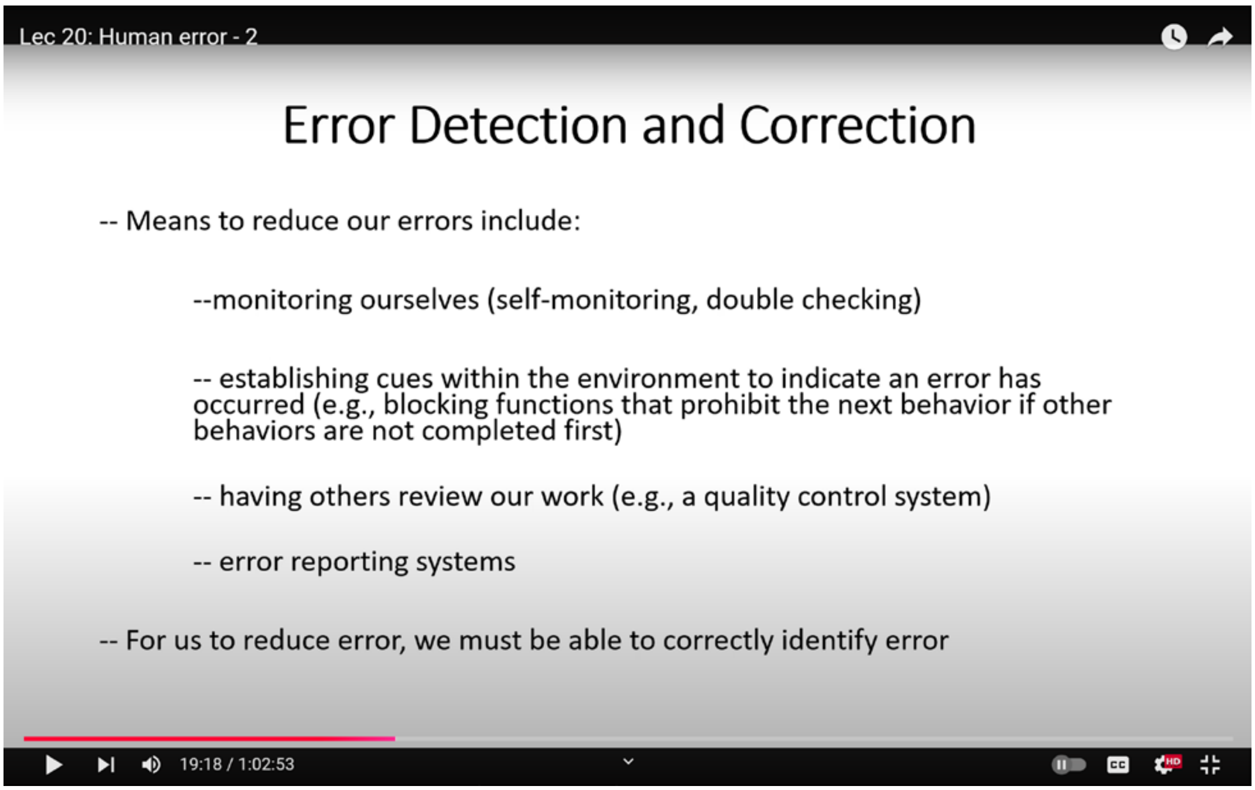

Establishing cues within the environment to signal that an error has occurred is another strategy that operators should implement. But how can we establish these cues? One approach is to use blocking functions that prevent the next action from occurring if preceding actions have not been completed. Self-checks and self-hindrances compel us to pause at a point of obstruction and verify whether we have completed the prior behavior. For example, if we want to eat food, one check we can implement is to see whether we have washed our hands.

By performing this check, we can ensure that we do not introduce any infection-related viruses or bacteria from our hands into the food we consume, which could lead to illnesses. Therefore, a fundamental rule is to wash our hands before eating. This serves as a blocking function. We can also involve others to review our work, which acts as another means of error correction. This involves engaging experts and colleagues to assess our work, thereby providing a form of quality control.

Lastly, we can establish error reporting systems to document errors and relay them to analysts who can later investigate how these errors occurred and identify potential points of error and corresponding solutions. To effectively reduce errors, we must be able to accurately identify them. A critical factor in error reporting is the capacity to recognize an error; without identification, reporting is impossible.

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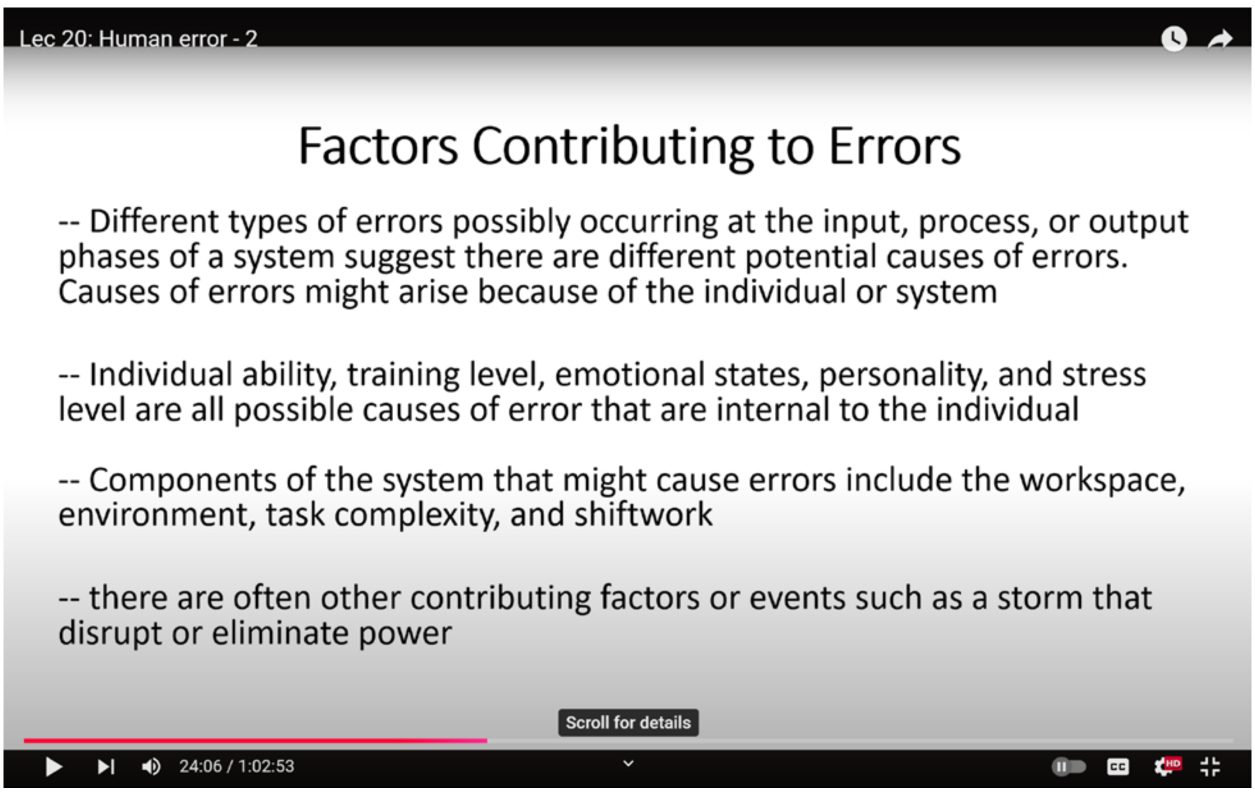

Several factors contribute to errors, and different types of errors may occur during the input process or the output phase of a system, suggesting varied potential causes. Errors can arise from individual actions or from systemic issues. The errors we have discussed thus far can manifest at both individual and system levels, encompassing multiple contributing factors.

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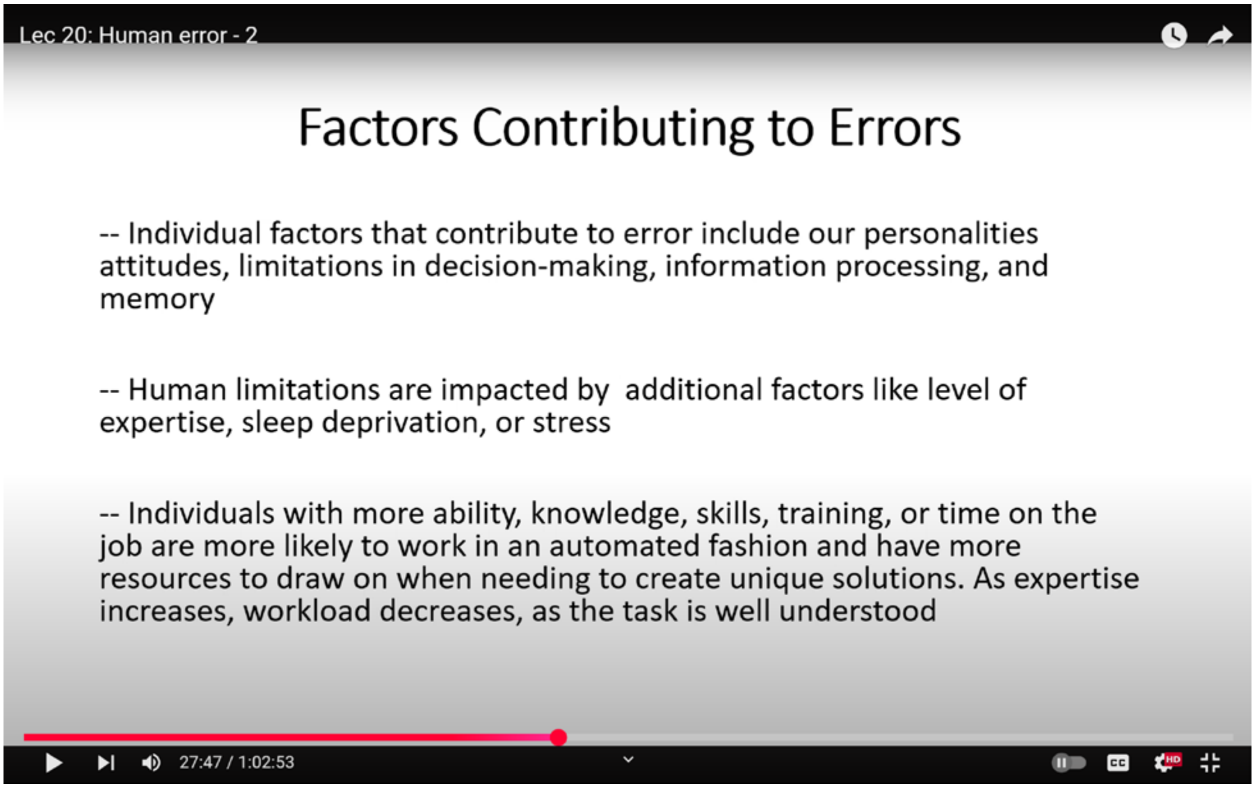

On the individual level, factors may include personality type, cognitive limits, and environmental influences such as stress and sleep deprivation. System-related factors might involve inappropriate design of the system or the use of output formats that are neither machine-readable nor human-readable, leading to errors. Let us examine these factors individually.

Individual capabilities, training levels, emotional states, personality traits, and stress levels can all serve as internal causes of errors. Individual-related factors include a person's ability to perform a job. When hiring, certain job requirements should be considered; for instance, someone in a banking role should be proficient with numbers. These selection criteria are vital. Additionally, the type of training individuals receive and their emotional states play significant roles. High emotional involvement can negatively impact decision-making abilities, while personality traits and stress levels contribute to errors.

On the system side, components that might cause errors include the workspace environment, task complexity, and shift work. The design of the workspace is crucial; it can be either open or closed, each with its own benefits and drawbacks. The complexity of tasks, the timeframes in which they are performed (whether during morning or evening shifts), and the number of shifts also contribute to the system factors associated with errors. External factors, such as natural events that disrupt electrical power, can also lead to errors.

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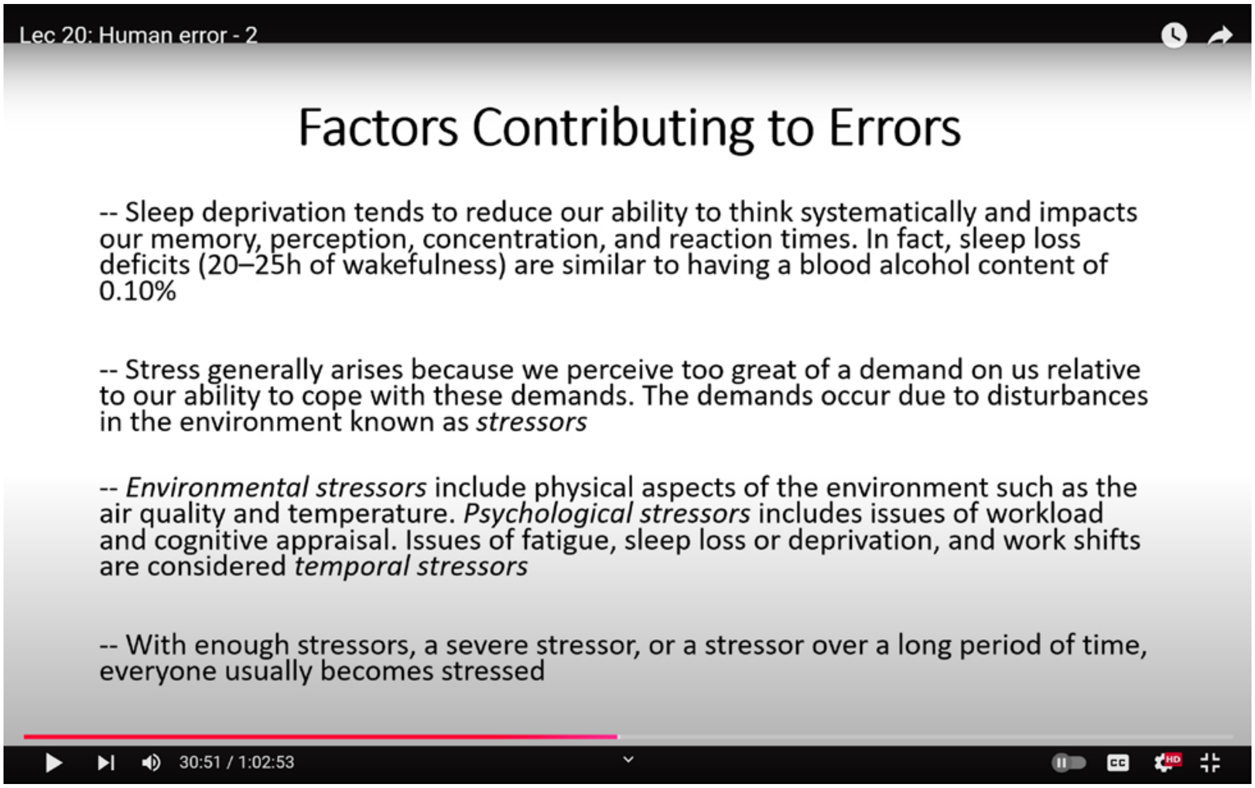

Individual factors contributing to errors encompass personality types, attitudes, limitations in decision-making, information processing, and memory. We have previously discussed these elements. For instance, personality types can vary from outgoing to more reserved, and attitudes reflect the strength of one's beliefs and emotional investment in them. Knowledge and expertise in a particular area can impair decision-making, while cognitive factors like information processing capacity and memory limitations are also critical individual factors in errors.

Additional factors like levels of expertise, sleep deprivation, and stress significantly impact human limitations. Individuals with greater ability, knowledge, skill, training, or experience are more likely to operate in an automated manner and possess more resources for developing unique solutions when necessary. As expertise increases, the workload tends to decrease because the tasks are better understood.

One effective approach to counteracting errors at the individual level is through the enhancement of expertise. As you gain expertise in your area of work, your experience increases, and your work performance becomes more automated. Consequently, this leads to a reduction in the number of errors requiring follow-up. With greater expertise, your workload decreases because you become familiar with all aspects of the system and the tasks you need to complete. A thorough understanding of these tasks enables you to perform them automatically, resulting in less time spent and a lower cognitive load.

Moreover, expertise can significantly reduce errors. Conversely, sleep deprivation is another factor that can contribute to errors. Research has shown that sleep deprivation diminishes our ability to think systematically and adversely affects our memory, perception, concentration, and reaction times. Sleep deprivation is associated with various cognitive deficits, and even just 12 to 24 hours without sleep can reveal these effects. Drivers who work both shifts and do not receive adequate rest exhibit noticeable cognitive deficits.

Interestingly, one effect that tends to increase with sleep deprivation is overconfidence in task performance. Although individuals may exhibit reduced performance, they often maintain a high level of confidence in their abilities. Studies have reported that the cognitive impairments resulting from 20 to 25 hours of wakefulness can be comparable to having a blood alcohol content of 0.1%. Thus, being awake for even 15 to 16 hours while working can create circumstances similar to those experienced by individuals with a blood alcohol content of 0.1%. Particularly among younger individuals, this overconfidence is often observed, reflecting their perceived abilities to perform tasks.

In studies involving Navy pilots, moderate caffeine consumption after periods of sleep deprivation was found to enhance performance and increase overconfidence in daily tasks. However, when comparing these pilots to those who had obtained sufficient sleep, a significant decrease in performance was noted due to sleep loss. Therefore, sleep deprivation is a critical factor that can lead to errors.

Stress is another contributor to errors. Stress typically arises when we perceive excessive demands on ourselves or our ability to manage these demands. When faced with numerous job and personal demands, we may struggle to cope, resulting in physical or mental stress. This stress hampers our ability to focus on work, potentially leading to errors.

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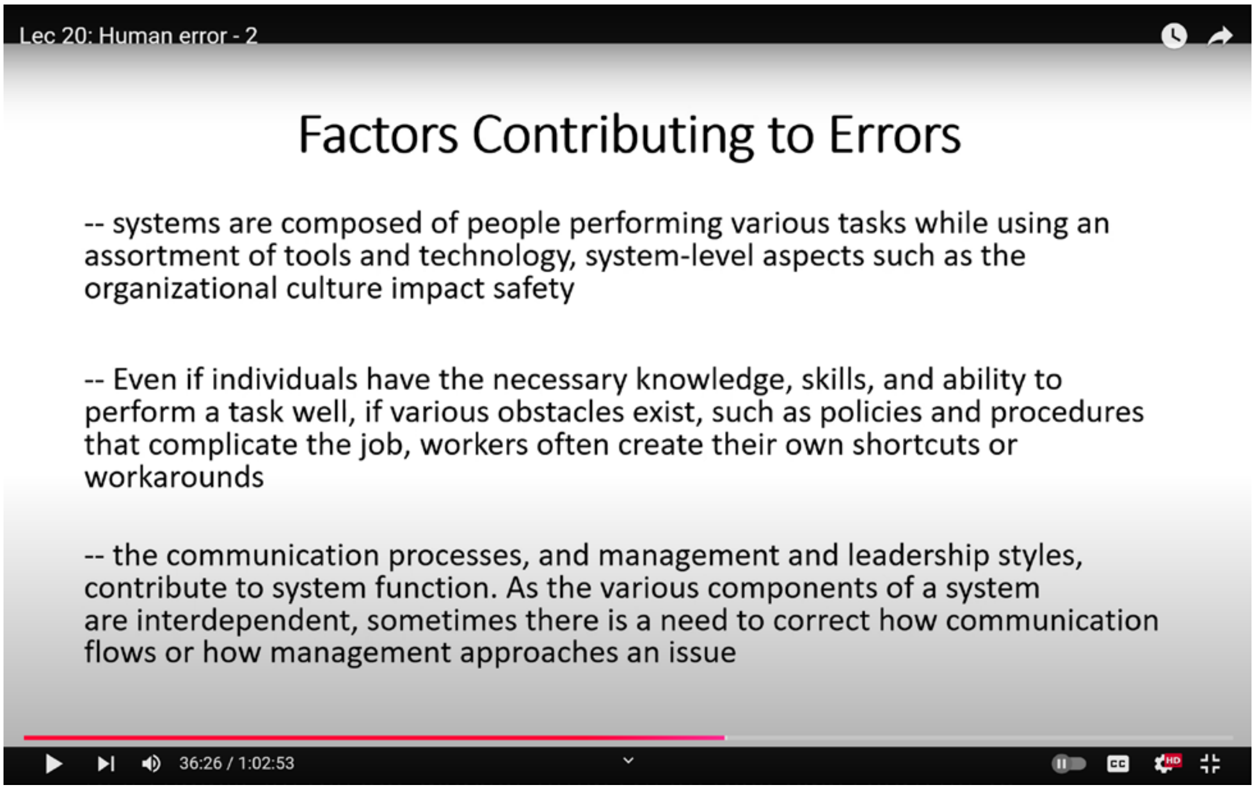

Demands often stem from environmental disturbances known as stressors, which can result in decreased performance. Task attention can be categorized into three distinct types. Environmental stressors encompass physical aspects of the environment, such as air quality and temperature, which we have previously discussed. Psychological stress pertains to issues related to workload and cognitive appraisal, as covered in earlier sections. Temporal stressors include factors such as fatigue, sleep deprivation, and work shifts, which are the primary focus of our discussion now.

Over time, the accumulation of stressors or the presence of a single severe stressor can lead to stress for most individuals. It is important to note that a single stressor, particularly if persistent or severe, can have effects similar to those of multiple stressors. The nature, duration, and type of stressor ultimately determine the level of stress experienced, which in turn can lead to errors.

System-related factors can also contribute to errors. Systems consist of individuals performing various tasks using different tools and technologies. Organizational culture can significantly influence safety; thus, aspects such as the type of organization, its culture, hierarchy, and policies can contribute to stress. Even if an individual possesses the requisite knowledge, skills, and abilities to perform a task effectively, obstacles such as convoluted policies and procedures can complicate their work. Consequently, employees may resort to creating shortcuts or workarounds.

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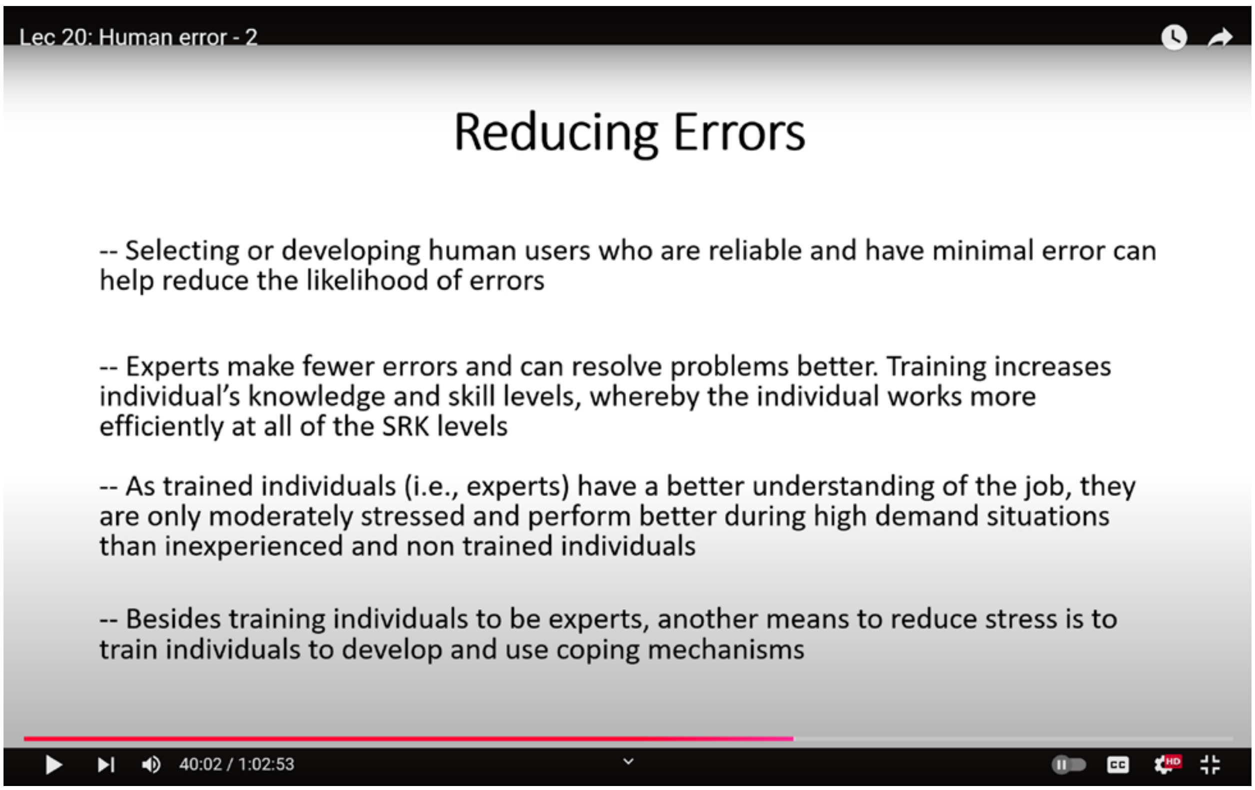

For example, in a system where an employee is responsible for monitoring tasks, if they are required to report their findings in multiple formats, such as handwritten notes, electronic records, and additional reporting methods, this can hinder their ability to solve problems efficiently. In such cases, even a skilled worker may struggle to resolve issues, and attempts to do so could lead to errors. Therefore, various system-related factors contribute to error occurrence.

The communication processes, management styles, and leadership approaches within an organization also impact system functionality. The nature of communication between employees and management, as well as the management style and leadership qualities, all play a role in system effectiveness. Given that the components of a system are interdependent, adjustments in communication flow and management strategies may be necessary.

Having established the existence of errors and discussed their contributing factors, the question arises: how can we reduce these errors? Selecting or developing reliable human operators with minimal error rates can significantly mitigate the likelihood of errors. Implementing selection and training programs designed to identify individuals with the necessary skills and higher reliability can help reduce errors. Experts tend to make fewer mistakes and are more adept at problem-solving.

Training enhances individuals' knowledge and skills, thereby enabling them to work more efficiently across the three levels of Skill, Rule, and Knowledge (SRK). As individuals develop expertise, their capacity for effective problem-solving improves, resulting in even fewer errors. By cultivating expert knowledge and enhancing problem-solving skills through training, we can significantly reduce the occurrence of errors.

As trained individuals, or experts, possess a better understanding of their jobs, they typically experience moderate levels of stress and perform better during high-demand situations compared to inexperienced and untrained individuals. Therefore, employing well-trained experts who possess relevant job knowledge can significantly reduce errors. In addition to training individuals to become experts, another effective strategy for reducing stress involves teaching them to develop and utilize coping mechanisms.

There are various coping mechanisms, both physiological and psychological, that can be imparted to workers. By employing these coping mechanisms, employees can mitigate their stress or at least delay the impact of stressors until their work is completed, thereby enhancing their performance. Effective coping mechanisms may include psychological strategies such as reframing thoughts about a situation or engaging in social interaction with a friend to discuss and alleviate stress.

As systems and tasks become increasingly complex, limitations in human information processing and memory can pose challenges. In complex systems, the type of information processing that humans engage in, along with limitations in memory and attention, can create problems that may lead to errors. To address these challenges, it is essential to recognize that while most skills can be retained in long-term memory, lengthy sequences of behaviors may be forgotten. Although rules and methods can also be retained in long-term memory, it is the working memory that is employed during job performance. The effective retrieval of rules and necessary actions in specific situations to reduce errors can sometimes be hindered by the absence of the appropriate retrieval cues.

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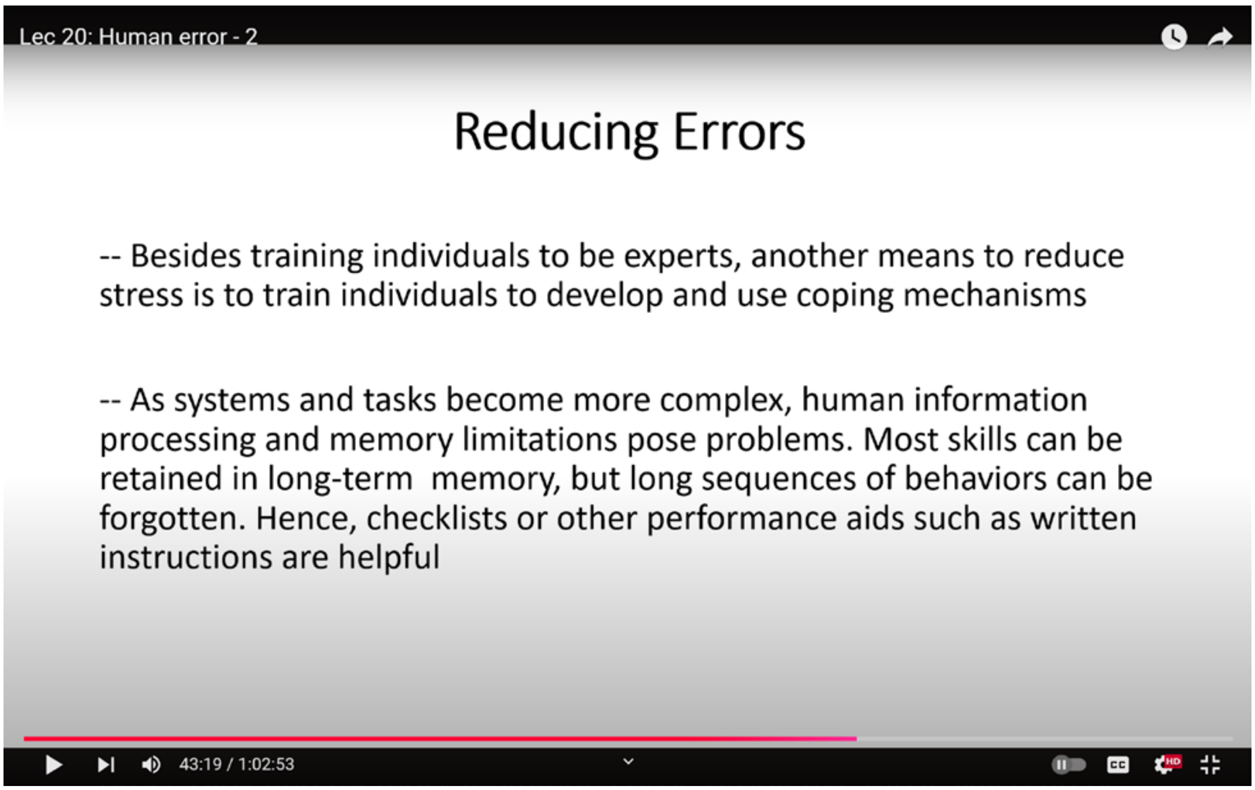

In such cases, implementing checklists or performance aids, such as written instructions, can be beneficial. For instance, most doctors use checklists to ensure that all critical procedures and functions have been completed prior to performing an operation. Similarly, airline pilots utilize checklists before flights to verify that all potential sources of error have been addressed. By ensuring that every detail is accounted for, checklists can help prevent slips, lapses, and mistakes.

At the system level, conducting system analysis can assist in identifying and correcting errors. Adopting a systems perspective allows for a better understanding of all interacting and influencing components within a system of interest. The feedback loop is crucial in evaluating how well the actual system output aligns with the ideal output, and any discrepancies identified can be addressed to mitigate errors. By establishing feedback loops among various system components, we can take proactive measures to prevent errors.

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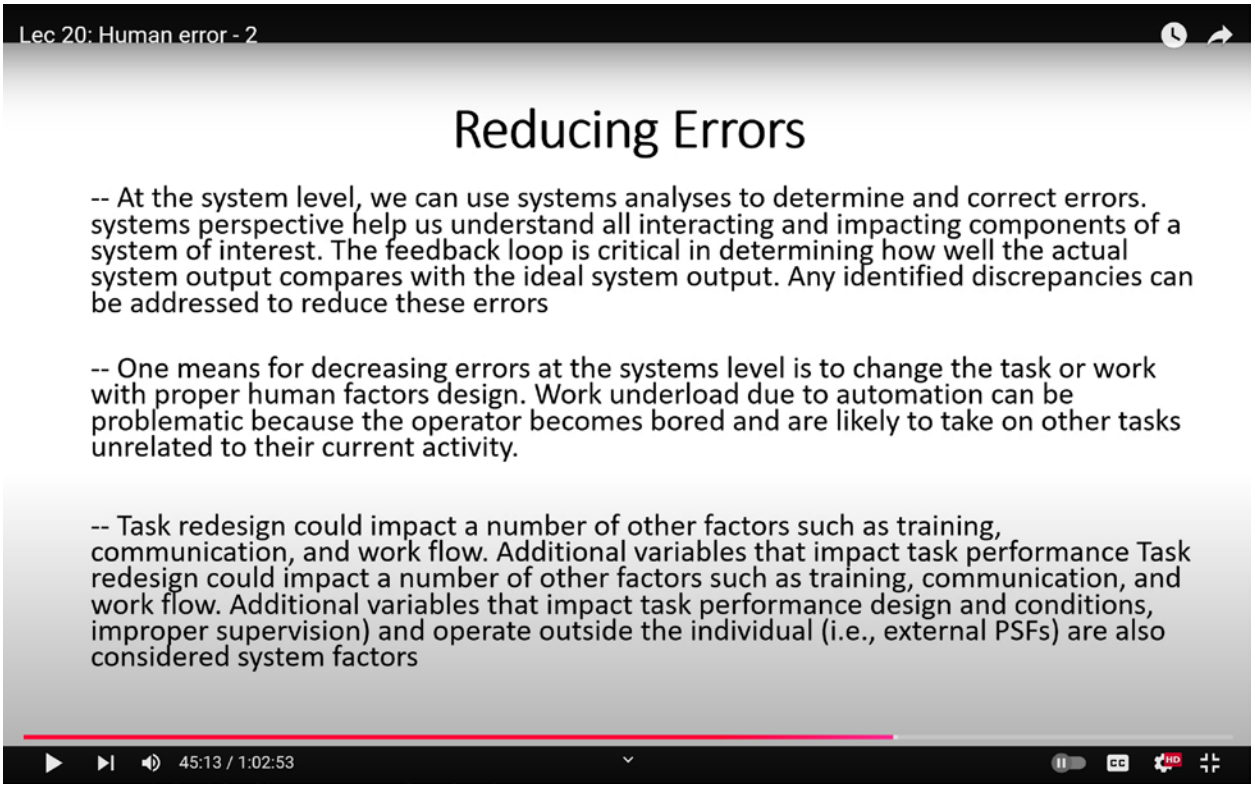

One approach to decreasing errors at the system level is to modify tasks or work environments through effective human factor design. Task redesign can enhance system performance by reducing system-related errors. By applying human factor design principles, we can change the task or system design to minimize the occurrence of errors.

However, excessive automation can create challenges, as operators may become bored and distracted, leading them to engage in unrelated tasks. For example, if a system is so automated that it requires minimal input from the operator, the operator may divert their attention elsewhere and fail to monitor the system adequately, which can result in errors. Therefore, it is essential to address tasks that may be under load. Task redesign can also impact several other factors, including training, communication, and workflow.

Additional variables influencing task performance include design and conditions, inadequate supervision, and external performance-specific factors, all of which are classified as system factors. A range of variables contributes to system-related errors, and addressing performance-related issues, supervision, and other factors is crucial for error reduction.

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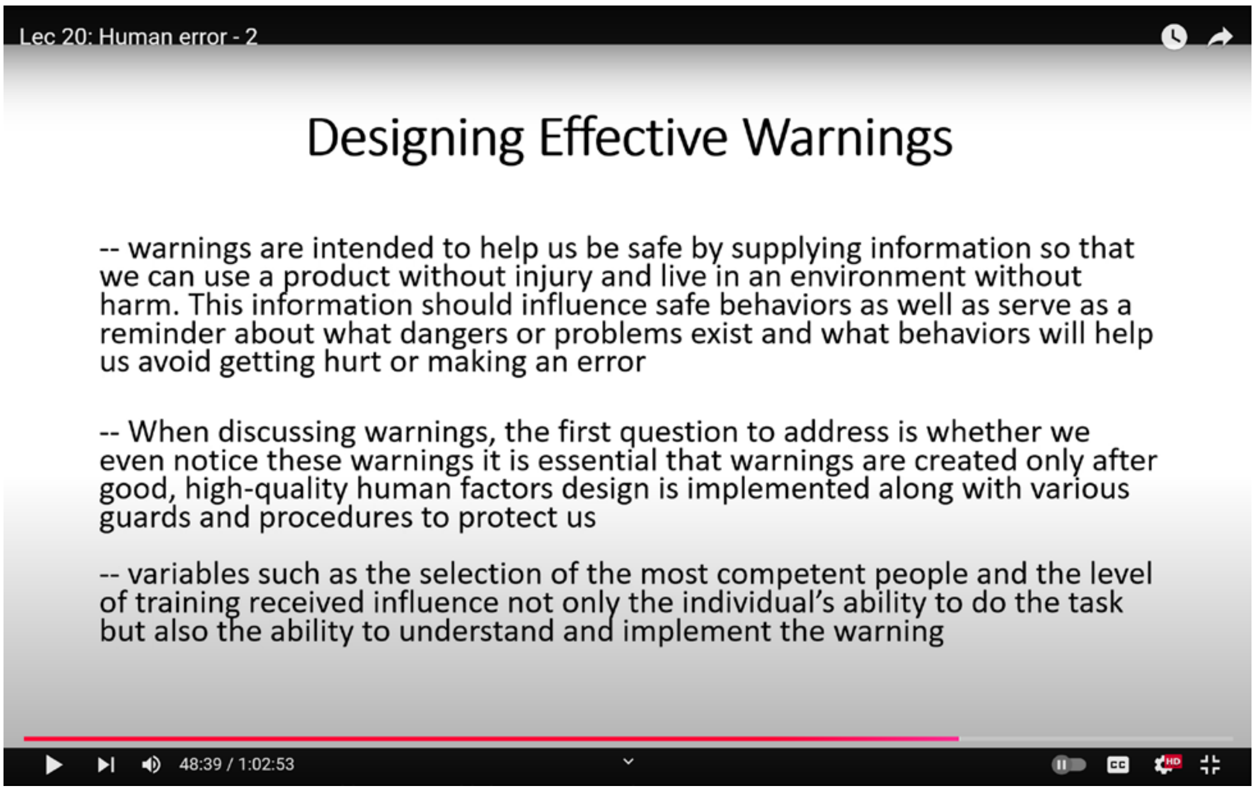

Designing effective warnings is another method to minimize errors. Warnings aim to help individuals perform their jobs safely by providing information that enables them to use products without injury and navigate environments without harm. Properly designed warnings can prevent numerous injuries and losses by promoting safe behavior and serving as reminders of potential dangers or issues, as well as the actions needed to avoid errors. When designed effectively, warnings can facilitate safe behaviors and alert users to situations that may lead to errors.

When discussing warnings, an important consideration is whether individuals actually notice them. Warnings must be developed based on high-quality human factor design principles, alongside appropriate safeguards and procedures for user protection. Frequently, warnings may be overlooked, as individuals fail to notice them. For instance, when purchasing a new phone, many users do not read the warnings provided on the back cover or packaging.

In some instances, warnings may be written in ways that render them imperceptible, leading people to neglect them and subsequently encounter problems. To create effective warnings, they should be highly noticeable. For example, symbols such as the skull and crossbones may be misinterpreted by young children as a playful reference to pirates rather than a serious warning.

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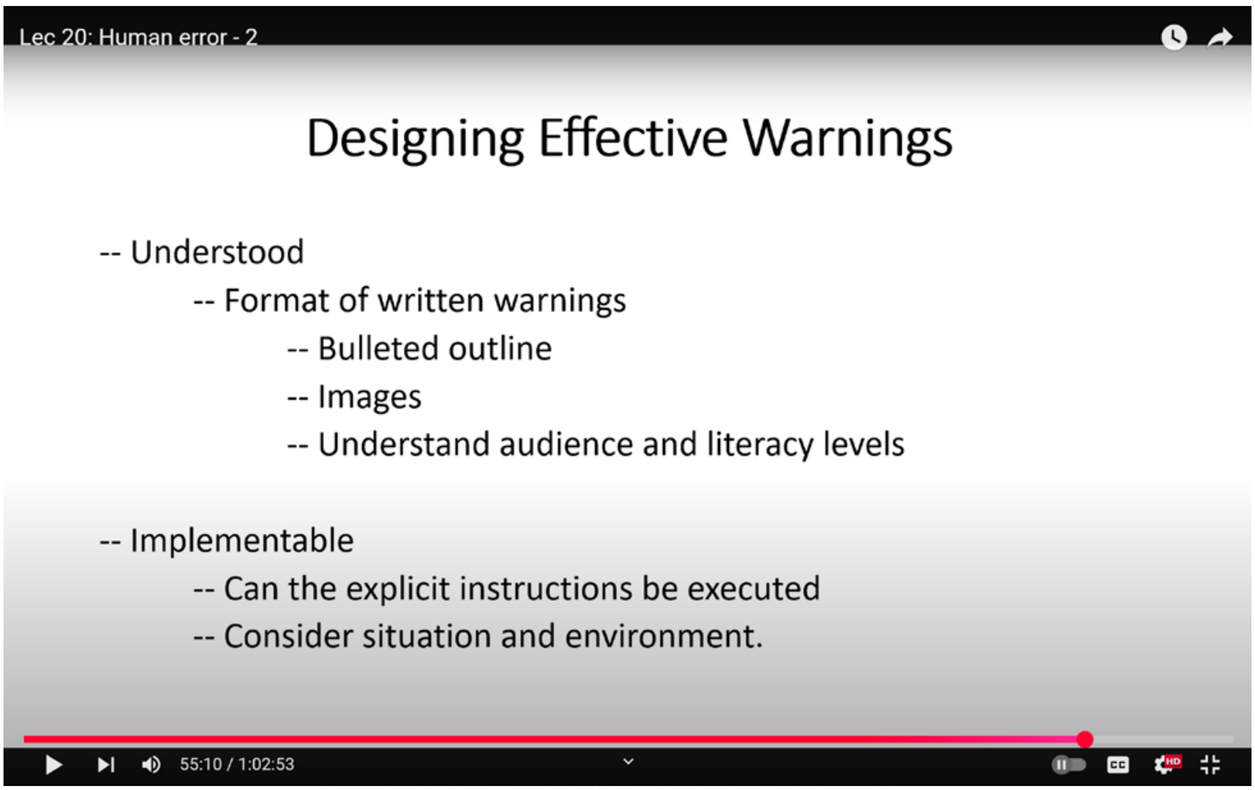

The warning symbol, such as the skull and crossbones, may be misinterpreted by young children as a reference to a pirate game. As a result, instead of avoiding a dangerous area, they might enter it, attributing a different meaning to the warning. Therefore, not only must warnings be noticeable, but their meaningfulness also plays a crucial role in reducing errors. Variables such as the selection of the most competent individuals and the level of training received significantly influence a person's ability to understand and implement warnings effectively. By employing the right individuals with the most competent skills, we can design better warnings.

An effective warning must be easily noticed. For warnings to be impactful, they should be not only noticeable but also understandable and implementable, which helps avoid or remedy errors. If a warning is noticeable but lacks clarity regarding its implementation, it becomes ineffective in influencing behavior and reducing errors. Thus, it is essential to ensure that warnings are well-articulated and thoughtfully crafted.

When designing a warning, it is important to consider the characteristics of the warning itself, the intended audience, and the situation or environment in which the warning will be issued. The warning must be clear and relevant to its target audience, whether that audience consists of children, older adults, or younger individuals. Furthermore, the context in which the warning is presented must be conducive to its effectiveness; if the environment is degraded or unsuitable, even a well-crafted warning may fail to convey its intended message.

Warnings typically fall into two categories: visual and auditory. Visual warnings include written notices, images, labels, signs, and signposts that depict actions to avoid or instructions on how to proceed safely. Auditory warnings, such as the beeps from a refrigerator or microwave oven, indicate that a function is complete or that food is ready. Both types of warnings should incorporate good human factors design principles to enhance their effectiveness.

For visual warnings to be effective, they must be within the viewer's line of sight during relevant events. If a visual warning remains outside the focus of vision, it is of little use. Therefore, warnings should be designed and positioned to remain within the visual range of the intended audience. In contrast, auditory warnings are less constrained since sound is omnidirectional and can emanate from any direction. However, messages delivered through auditory means should be simple and concise; lengthy or incoherent warnings can cause confusion rather than aid.

For instance, at airports, walking escalators often produce loud warnings about appropriate usage, which can benefit users but may become a nuisance to others nearby. Thus, alternative warning methods should be developed to ensure they do not inconvenience those not directly involved.

To design effective warnings, clarity is paramount. The format of a written warning could be presented as a bulleted outline or through imagery, ensuring it is understandable for audiences with varying literacy levels. Using overly complex or technical language in warnings will render them ineffective. Incorporating pictures or other non-linguistic methods can make warnings more accessible to a broader audience.

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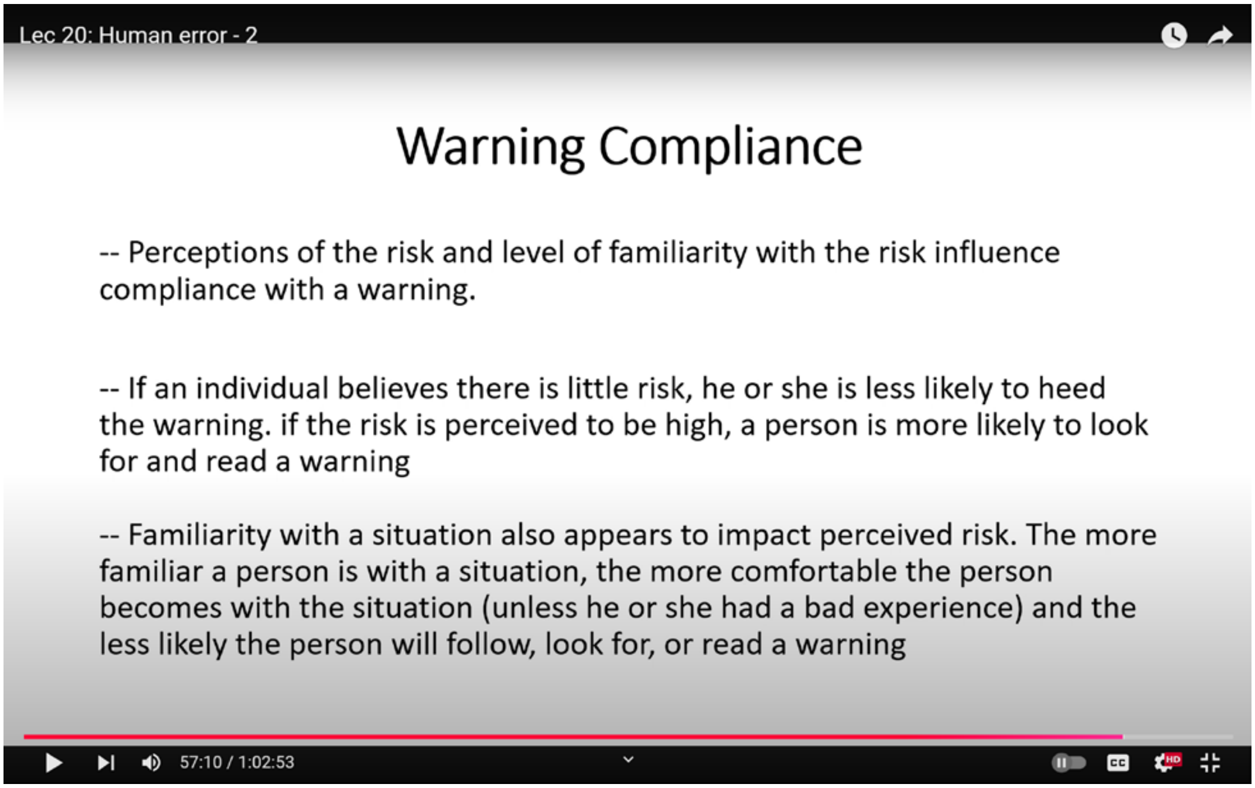

In addition to clarity, it is crucial to evaluate whether the instructions provided by the warning are explicit and whether the situation allows for their implementation. Once a warning is issued, compliance is essential. The perception of risk and familiarity with that risk both influence an individual's compliance with a warning. If a person believes that the risk is minimal, they are less likely to heed the warning. Conversely, if the perceived risk is high, individuals are more inclined to seek out and read the warning.

Thus, warnings should be designed to convey an immediate sense of high risk to encourage compliance. Familiarity with a situation can also affect perceived risk. The more familiar someone is with a situation, the more comfortable they may feel, unless they have had a negative experience that alters their perception. For example, while traveling on a train, many people lean out of the doors despite warnings not to do so. Their repeated experiences lead them to believe that the warning is irrelevant, until one day, they might fall from the train and realize the warning's significance.

Thus, even if one is very familiar with a situation, it remains important to heed warnings. Compliance with warnings often involves a cost-benefit analysis, where individuals weigh the perceived risk against their own experiences and comfort level.

While complying with a warning, individuals often conduct a cost-benefit analysis, weighing the perceived risk against the benefits of following the warning. When the perceived benefit of compliance is high, a person is more likely to adhere to the warning. Conversely, if the perceived cost of compliance is deemed high due to a belief that the environment is unsafe and that precautionary behaviors are unnecessary, the likelihood of compliance decreases. Therefore, compliance is influenced by an individual's perception of the warning and the associated risks.

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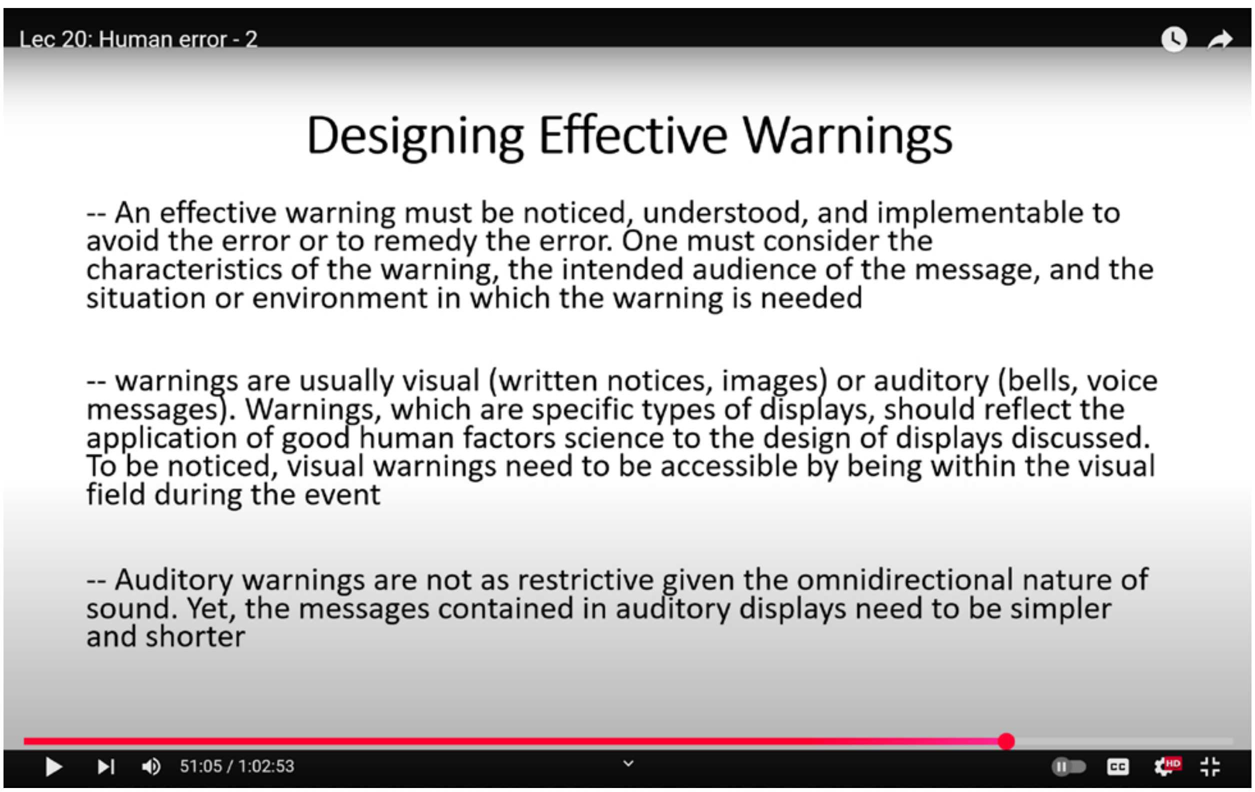

To enhance compliance, warnings must be well-designed to ensure they are noticeable and understandable, preferably accompanied by clear images. To achieve higher compliance with a warning, it is essential to create a meaningful and noticeable image that conveys a high risk associated with non-compliance. The warning should explicitly address three key elements:

1. Hazard Identification: The warning should clearly state what the hazard is, such as the presence of a fire.

2. Consequences: It should inform individuals of the potential consequences of the hazard, such as the risk of getting burned.

3. Recommended Behavior: The warning should specify the proper actions to take to avoid the unsafe situation, such as not placing one's hand in the fire or engaging with the flames.

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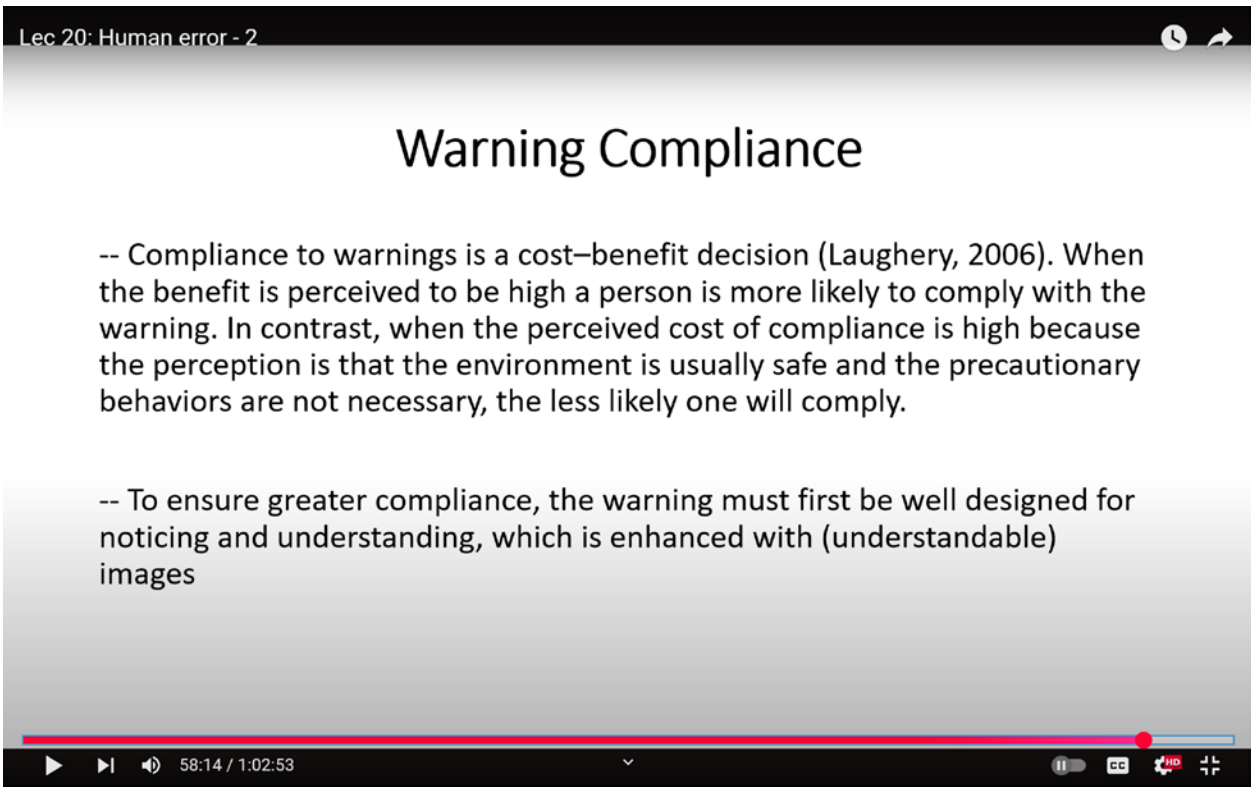

A warning that effectively communicates hazards, consequences, and appropriate behaviors is considered a good warning.

Auditory warnings have the advantage of being omnidirectional, meaning they can be heard from various locations without requiring a specific point of focus. However, these warnings must be designed to stand out against background noise. Additionally, oral or voice messages should not be overly complex, as individuals may habituate to these warnings, leading them to ignore the messages altogether. To prevent redundancy and excessive repetition, auditory warnings should be crafted to maintain their effectiveness.

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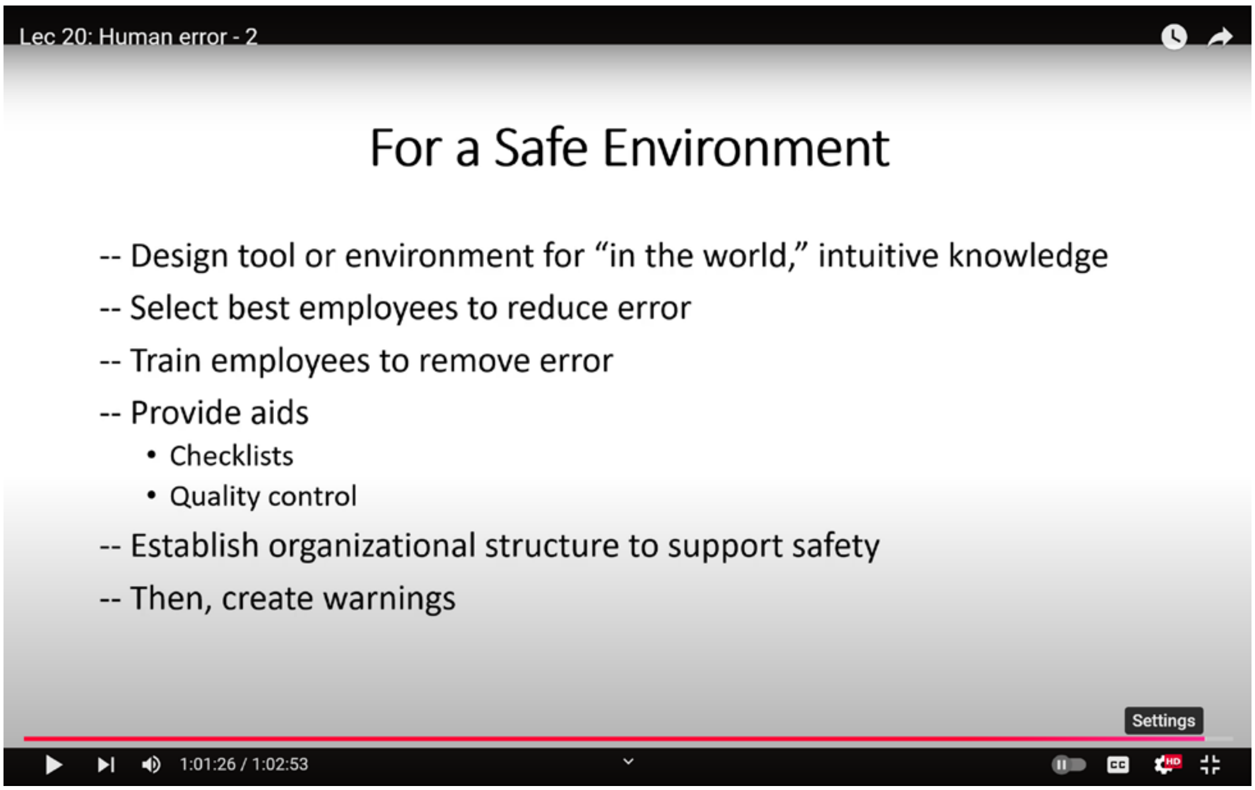

To design a safe environment, several steps should be followed. First, tools and environments should be intuitively designed based on in-world knowledge, allowing individuals to perform tasks using established rules or skills without needing to rely on knowledge-based behaviors.

Second, it is crucial to select the most competent employees to minimize errors. Focusing on the recruitment and training of individuals who are best suited for specific jobs enhances overall performance. Regular training should be provided to ensure employees can execute their tasks more effectively, along with the provision of aids such as checklists and quality control measures to help prevent slips and mistakes.

Establishing an organizational structure that supports safety is also vital. A healthier organizational framework with fewer policies and obstacles can create a safer environment and reduce the incidence of errors. Furthermore, clear warnings can guide individuals on what actions to take and how to conduct themselves, thereby minimizing the likelihood of errors.

In this section, we discussed human errors, outlining the various types that exist, the factors that lead to these errors, and the measures that can be implemented to reduce them. I elaborated on different mechanisms for studying errors and human reliability, as well as the system- and individual-based factors that significantly influence error production. This concludes our discussion for now. Namaskar and thank you. Thank you.