Research Methods In Politics Essay, Research Paper

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Can we ?generalize? from empirical data?

A 300 word short essay, for MA international politics.According to a widely accepted view, empirical sciences can be characterized by the fact they use ?inductive methods?. Empirical science emphasizes the role of experience in human knowledge: that all concepts are derived from the experience to which they are applied, ultimately all knowledge of matters of fact is based on, or derived from experience. Accordingly all knowledge of the world can be justified only by experience. This however undermines the role of reasoning in human knowledge. Empiricism argues that knowledge derived from a priori reasoning either does not exist or is confined to ?analytical? truths, which have no content, deriving their validity merely from the meaning of the words used to express them.According to Popper, ?a scientist, whether theorist or experimenter, puts forward statements, or systems of statements, and tests them step by step?, but ?in the field of empirical sciences, more particularly, he constructs hypotheses, or systems of theories, and tests them against experience by observation and experiment. According to this method, the logic of scientific discovery would be identical with inductive logic. An inference can be referred to as ?inductive? if it passes from singular statements to universal statements. Popper sighted induction as a problem in the empirical sciences, he argues that, ?from a logical point of view, we are justified in inferring universal statements from singular ones no matter how numerous; for any conclusion done in this way may always turn out to be false: he gives a simple illustration by saying that, ?no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white.In Poppers view, ?generalizing? from empirical data or making inductive inferences ?is superfluous, and that it must lead to logical inconsistencies. He also argues that ?people who say of a universal statement that we know is truth from experience usually mean that truth of this universal statement can be reduced to truth of singular ones since the account of an experience or observation is in the first place can only be a singular statement. In Poppers view, the various difficulties of inductive logic are numerous and he stands to oppose all attempts to operate with the ideas of inductive logic or ?generalizing? from empirical data. However, Popper attempted to develop a theory of ?the deductive method of testing, this view asserts that ?a hypothesis can only be empirically tested ? and only after it has been advanced.

References,Popper, Karl. The Logic of Scientific Discovery, 1959, London.Popper, Karl. Realism and the aim of science, 1982, London.Climatic wind tunnels for vehiclesContents-Abstract-Introduction1.Full ? scale and model scale climatic wind tunnels2.Design feature3.Boundary layer simulation4.Rain simulation5.Cryogenic application6.Fan position7.Cooling8.Conclusion

AbstractIn recent years several development works has been done to achieve the aerodynamic qualities and thermal characteristics of vehicles. The wind tunnel is an essential development tool, with which reality is simulated. The literature survey on the climatic wind tunnels is to give an account of what is an available and current trend. And to discus how the climatic conditions are generated included cryogenic application, also to specify whether, the tunnel is full ? scale or model scale. Also to describe the design features of climatic wind tunnels.The survey shows that, the full ? scale climatic wind tunnel is the most common scale in the new automotive tests. Also the survey presented an examples of the latest climatic wind tunnel with its design features. The cost of climatic wind tunnels facilities is comparatively high with others types of wind tunnels, but some of some of these tunnels could be used as an all ? purpose system so that the investment cost and operation cost will be lower while flexibility is much higher. Most of the designers prefer to work on full ? size cars in the automotive tests because judging the shape of scale models is very difficult and uncertain.IntroductionThe wind tunnel is an indoor facility where the subject body (either a scale or full ? size model) is stationary and the air moves instead. The climatic wind tunnel is designed for testing vehicle thermal systems under climatic operating condition. More over it is used to optimize systems performance and ensure complete thermal comfort for vehicle occupants. Some of the new climatic wind tunnels have environmental research facility that could provide the open road simulation of temperature, humidity, solar, wind and dynamic road load conditions. (hucho, 1987).

In the new climatic wind tunnel the test applications and capabilities have increased, the test applications include:?Air conditioning systems

?Engine cooling systems

?Window defrost / defog / demits systems

?Heater systems

?Passenger cabin ventilation

?Under body temperature effects

?Engine management system developmentThe aim of the literature survey is to produce an account of what are available and current trends in climatic wind tunnels, including cryogenic applications (below 0?c). It is also to specify whether the tunnel is full ? scale or model scale, as well as, to describe how the climatic conditions are generated. And to discus the design features.Full ? scale and model scale climatic wind tunnelsIn the automotive research, engineers use two types of wind tunnels; model scale wind tunnels for testing scale model automobiles and full ? scale wind tunnels for testing cars or small trucks. The first type is mostly used for drag tests, while the full ? scale wind tunnel could be used as an all ? purpose system for automotive research. In this type, the car engine runs with suitable power for speed, this capability of full scale tunnels guarantees efficient cooling for several driving conditions. In fact, there is an advantage for model scale wind tunnels which is the ease of the smaller models transmission and the capability of shape alteration, and many tests have been executed on scale models. But this trend is decreasing according to the development of passenger cars and test techniques, as well as the mutation of scale models to full ? scales to adopt the test technique. According to the possibility for testing a car in the ready ? to ? drive state especially in the free suspension case, when the vehicle is loaded with one half of the maximum admissible load. The vehicle is supposed to perform in a similar way in the tunnel as it does on the road. However, ?as a rule the suspension is fixed for tests on full ? scale models. Models are considerably heavier than the finished vehicle?, therefor; it would be unrealistic influence of the air forces and moments on the vehicle position. The advantage of easy handling and the ease of quickly modifying the shape are gradually lost with increasing the model dimensions to achieve the Reynolds number of the large version with scale models. The Reynolds number has a significant influence on the flow around the wheel.Designers would rather use full ? size models because judging the shape of the scale models is uncertain and difficult. In Europe the scale 1:4 was the most common scale for models. Also the scale 1:5 is use, whereas in USA the scale 3:8 was the most common model. The available scales for commercial vehicles are the scale 1:10 and for large wind tunnels was 1:2.5.

However, today the wind tunnels techniques have been improved, (appendix A) includes a survey on the current trends in climatic wind tunnels. Boundary later simulationThe boundary layer building up on the test section floor affects the flow conditions below the vehicle underbody and cannot be neglected. The form of the earth?s surface influences the atmospheric boundary layer. Any form of roughness of surface increase an atmospheric boundary layer of a certain type. According to the different existing territories, there are three different types of boundary layers (rough, semi-rough and smooth), each one having corresponding velocity profile. A lot of research has been carried out to produce the required velocity profiles; some of these ways are more accurate and feasible than others. The two main tested techniques are;1Creating a scaled ? down ? terrain ? the surface roughness method.

A small scale of forest with miniature trees or town with small models of buildings could be created to simulate a small scale of realistic atmospheric boundary layers. A model car could be used in this test instead of a full size car. However the advantage of using small-scale terrain is the most accurate method of creating realistic atmospheric boundary layers. On the other hand the disadvantages are; long length of tunnel is required and it is time consuming to arrange and rearrange the required terrain.2Using varied resistance screen.

The second method uses a screen a screen of horizontal bars with graduated spacing between them. These bars restrict the airflow and reduce the velocity at various vertical positions. This method is suitable to a limited domain; the vertical screen minimizes the required length of tunnel to create a suitable boundary layer. The tubes of the screen may be used as part of the cooling circuit, also there could be there could be interchangeable screens to produce the individual velocity profiles. The disadvantage of this method is that the screens on the whole do not represent completely accurate boundary layers.

The angled screen option was introduced to create better boundary layer than the vertical screen option, but this fact cannot be used because of the space availability. Another option is to use a grid screen with vertical and horizontal bars, which contains many small square holes, which does not create the required velocity profile for this application. According to the calculation, the screens use a larger number of smaller diameter bars, which would improve the accuracy of boundary layer simulation. It is very smooth and does not affect the blockage ratio. Also this increases the bars? quantity and reduces its diameter, causing faster heat transfer to the circulating coolant through the bars, which will increase the efficiency of the cooling system. In this method the screens may produce excessive velocity near the floor of the test section. Design featuresClimatic wind tunnels designed for testing vehicle thermal systems underside ? ranging climatic and operating conditions. The following special features are provided in the current trends in climatic wind tunnels:1-Tests are usually run at speeds around 55 mph, and tunnel maximum speeds are between 0 to 125 mph and in some new tunnels between 0 to 155 mph.

2- The test section is preferred to be as large as possible within space and tunnel cost considerations, desirable would be 39? length, 24? wide and 16? height.

3-The four wheels require a turntable with roller, which is connected to dynamometers So that the engine will produce the required horsepower.

4-To remove the boundary layer or at least 50 %. It should be used a slot across the test section near the entrance con. Without or with the function of the boundary layer removal system, it will circulate the tunnel air in the test section.

5-In order for the clay to be used for changing styles, a suitable tunnel refrigeration system should be used to keep the tunnel cool enough.

6-To check the wind shield wiper operation and to make design changes to keep the side windows clear of water, a rain simulation should be used. Freezing rain is also needed.Rain simulationThere are different types of rains could be simulated in wind tunnels, it is depending on their liquid water content and their average droplet diameter.

The following information were found from the previous research,The factors controls the choice of the nozzle are spray diameter, liquid water content, spray angle and the flow rate.

There is a possibility of using one interchangeable nozzle, which could be removed and substituted depending upon the required rain type, in this case according to the required rain type; the position of each nozzle over the car needs to be changed. It is often necessary to have more than one nozzle if the aim is to achieve the correct spray area. According to the work which has been done by Nottingham University students on a small climatic wind tunnel, it was found that 14 nozzles were required in the case of drizzle. This caused a problem in that only 2 nozzles were required to achieve the correct lwc (liquid water contamination), and by having more nozzles, the lwc will increas. The decision in this case depending on the test requirement, if the droplet size and the spray diameter are more important than the lwc, then 14 nozzles can be used. However, if the lwc is more critical, 2 nozzles can be utilised but it is attached with deflector plate below the nozzle orifice, the spray diameter could be increased.

Eccentric flow hollow cone nozzles have been used to simulate the light, moderate, excessive and heavy rain. The tangential liquid supply to the mixing chamber causes liquid rotation. The droplet size is greatly affected by forms around the walls of the nozzle. The liquid flow rotary motion is transformed into axial and tangential speeds through the nozzle orifice. The liquid flow leaves the nozzle orifice as fine droplets.Cryogenic applicationNowadays, tunnels have the capability of the cryogenic application. Vehicles could be tested under low temperature conditions (under 0?c), also by using the hydraulic circuit formation from ice could be created. The cryogenic capabilities allow engineers to simulate the most sever atmospheric condition, such as a layer of frost, ice, snow or a combination of all. The effects of these conditions on the car are:

-reduces visibility

-reduces passenger comfort.To create the ice layer, first, the temperature of the test section and car should be lowered to the required level, and then a fine rain should be sprayed on the windscreen. The after a short time will transform into ice layer. If any ice crystals existed, the collision of the warm water with the ice layers surface causes the ice crystals to melt. In addition, the continuous rain causes the ice crystals to get thicker. The cycle will be repeated until the required thickness is achieved. The continuous in spray function fills the gaps in the ice structure.Fan positionA large axial displacement fan must be used to move the required large quantity of air. In order to reduce the heating effects within the test section and allow conditions of steady flow to develop, the fan must be located at the optimum position, which is as far as possible from the test section. The fan could be positioned centrally between the bends and a standard component, to reduce the fan noise. This also minimises the influence of the fatigue wear.

CoolingA great deal of research has been done to find a variety of cooling techniques. One of which is to have an air exchange system, where cooler air could be sucked into the test section from the surroundings. However, these methods create a high-pressure drop, which will influences the optimum fan. Another concept was to have tubes of coolant circulating through the wall around the ducting, or a water jacket around the fan. An additional suggestion focused on the type of finned tubes. In case the coolant passes down through all the bars at once and leaves the screen at the bottom. The use of the boundary layer as a joint heat exchanger is the best solution. But the cooling efficiency will be decreased.ConclusionClimatic wind tunnels have been developed to meet up with the technological improvement of recent years. As a result of this improvement, the climatic wind tunnels capabilities have increased. The literature survey shows that, the full ? scale climatic wind tunnels have become the most common model being used today. Most of the designers prefer to work on this type of models, but the high cost of the large full ? scale wind tunnels is still a major problem. However, the high competition in the automotive industry to satisfy the customer requirements has lead companies to invest heavily to improve the climatic wind tunnels. Also the survey shows the model scales which were available. Today, the model scales could be use for the limited and small research. So far, the literature survey has covered the current trends in climatic wind tunnels and its design features. Also the survey discussed the climatic conditions simulation including the cryogenic application.