“ Physical Tests in Relation to the Force of Pull & Push “

Introduction:

In orthodontic therapy the use of latex elastic , coil spring , straight or arch-forms of wire with spring flexibility like NiTi, Multi strand,coaxial and so on are being used every day.

The aim of using these devices is to amend dental arch and occlusion.physics is also a study of what can cause an object to accelerate.that cause is a force,which is,loosely speaking,a push or pull on the object. Deformation does not occur vertically , horizontally or transversally unless the force is exerted on tooth or the bone itself . The author , by doing a set of tests, examines the forces of pull & push and surveys the results on the kind of movement.

As the point of force effect is always on top of the object, the movement should be in the form of Tipping , but the results are somehow different. Because, in treating orthodontic therapies we make use of push & pull forces , so a clear understanding of these would help reach the objectives and also boost the making and design of the orthodontic devices.

abstract:

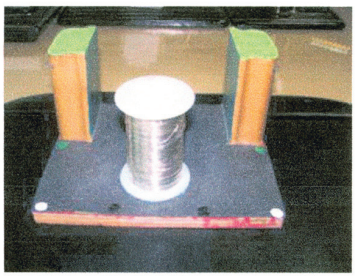
Experimented physical tests clearly showed that the push–force , under any circumstance , could not cause the full bodily physical replacement of the object and the physical object has always been tipping. But the pull- force , could , with the exception of three cases , always replace the object , on a high–frictional surface in bodily form . Experimental tests clearly show the high ability of bodily movement of the physical object by pull force.

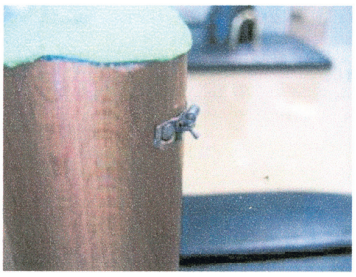
Key words:

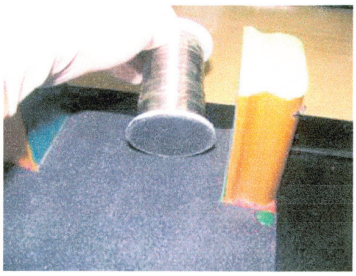
Force , Push , Pull, Tipping , Bodily, attachment , Non–rigid , Semi–rigid ,direction .

Method and Material:

In dealing with tests , several devices have been used , of which the most significant one , being made of wood and all related tests have been done on it .Photographs have been taken in every phase and the results of physical replacements could be verified by comparing these photographs.







Equipment needed for these tests are as follows:

-The principal device for experiment consists of a wooden rectangular surface , which is covered by a sandpaper or carborundum . Two wooden posts are fixed on its two corners which , to each one a basal tube is attached .

-A movable cylinder–like object , made of wiring ligature , with its-
bottom covered with sandpaper . This sandpaper–covered surface being adjacent to the carborundum surface of the bottom of the principal device, highly–frictional force is produced .

-Arch–wire made of steel with round cut and .018 inch in diameter .

-ligature wire for attaching arch–wire and movable cylinder shape object together or any instrument to tie round it and to give it a handle to be pulled.

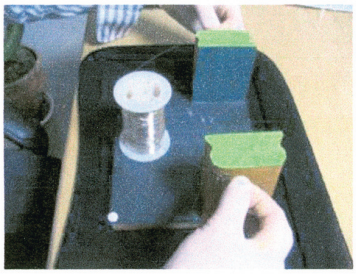
-Elastic traction .
-needle holder .
In these experiments , whenever attachment of arch wire , fingers or needle holder with the movable cylinder is tight and closed , it is called Semi Rigid Attachment .

Where as if the tie is loose & the instruments are not tightly attached , it is called Non–Rigid Attachment.

If the process of attaching is hard and soldered , then it is called Rigid Attachment , and it is not clearly visible in these experiments .
-In all these experiments, there is only one force and in one direction .

First Experiment
Force: push & pull
Attachment: Semi Rigid

Movable cylinder object is tied to the frontal arch-wire by wiring ligature, and two ends of arch-wire are passed through attached vertical posts , so that the ends could be touched by fingers.
Photographs taken show that the amount of force, when reached to a considerable level , the Tipping of the physical object is being done properly. in this case,the object is being pulled backward.
In the following phase , the physical object is pushed forward with the same particulars , again it is noticed that the physical object is being tipped forward.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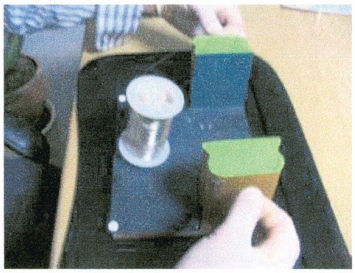
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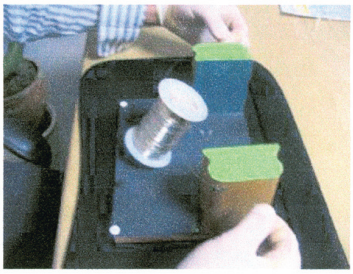
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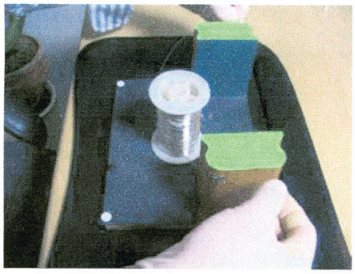
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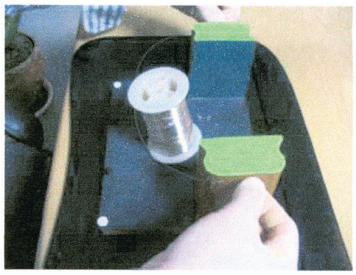
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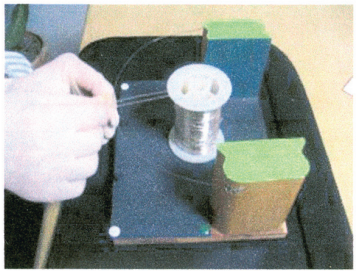
Second Experiment
Force: Pull
Attachment: Non-Rigid

In this experiment, the movements of the arch-wire ends are prevented by making loops (Mesial Stop). then by attaching one end of a rubber band to the object and the other end , to arch-wire , the physical object is pulled forward . Photographs show that it has been tipped .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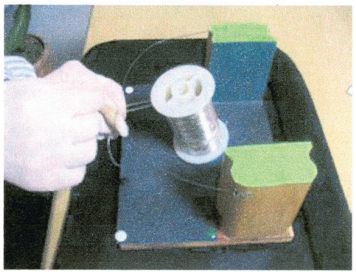
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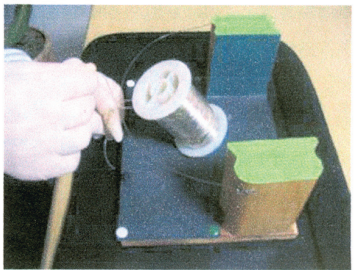
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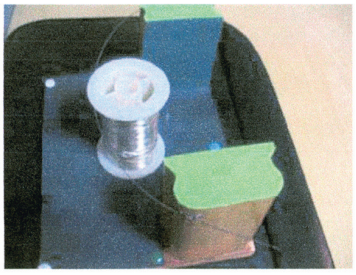
Third Experiment
Force: push & pull
Attachment: Semi-Rigid

The frontal part of arch-wire is attached to physical object by wiring ligature. Both sides of the attachment points are held by our fingers . Once we pull the physical object forward , we notice the bodily forward movement of the physical object .
In another phase , with the same circumstance, the physical object is pushed backward . The physical object is completely tipped.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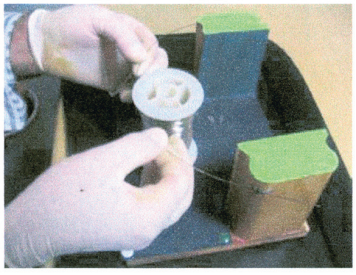
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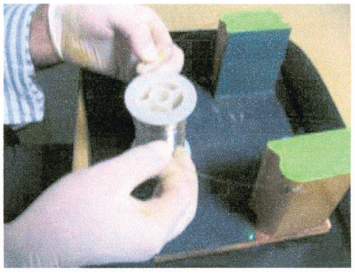
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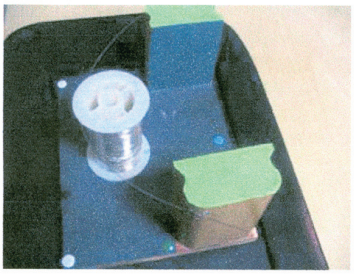
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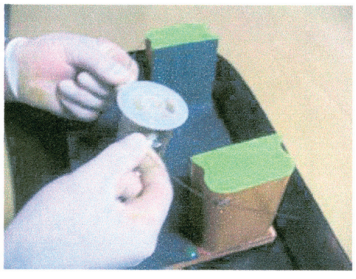
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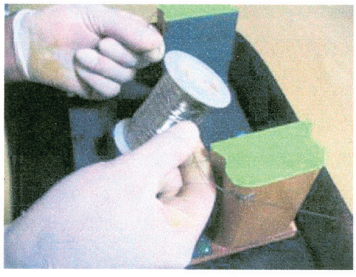
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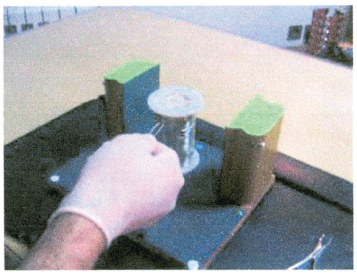
Fourth Experiment
Force: pull
Attachment: Non-Rigid

In this experiment the physical object is tied by a ligature wire so that the two ends of the wire could be held by fingers , with a distance from the object .
In the first phase of the experiment, the two ends of wire are pulled horizontally . It is noticed that the physical object is being tipped , (Tipping)
In subsequent phase , the direction of pull is forward & upward , but the physical object is replaced bodily .
This stage of the experiment , the nearness or the coincidence of direction effect of the force (The line of action of the force) with the centre gravity of the physical object , is a proof of bodily replacement.



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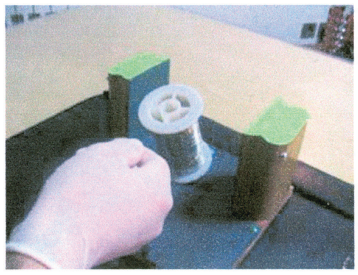

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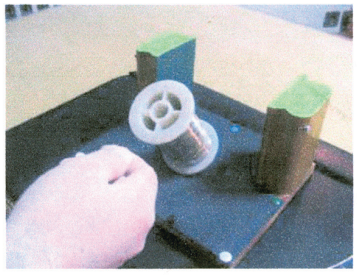

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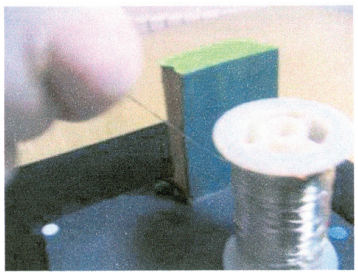

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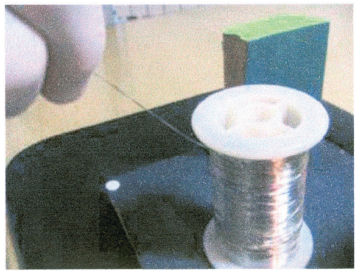

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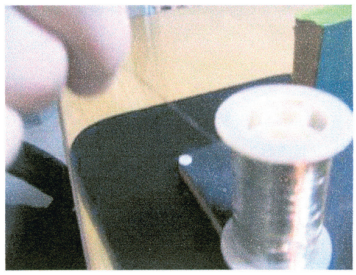

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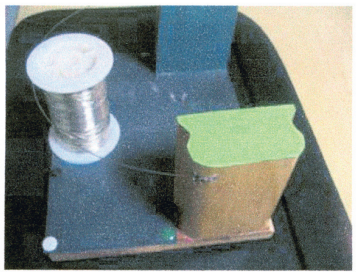
Fifth Experiment
Force:push & pull
Attachment: Semi Rigid

In this experiment , by creating a loop we make a Mesial Stop . Loop causes the movement of the end wire in the tube hole to be stopped . Then the physical object is attached to the frontal part of arch-wire by ligature wire.
The object is replaced to backward for doing test. two sides of the attachment point is being held by fingers of both hands and pull the physical object forward.(pull) It is noticed that it is easily & comfortably bodily displaced . In this replacement, because of Medial Stop, the physical object is easily bodily replaced by meager force of fingers exerted to it . In fact the presence of Mesial Stop causes to reach the maximum pull-force.

In another case the object is also pushed backward with the same particulars but it is being tipped.



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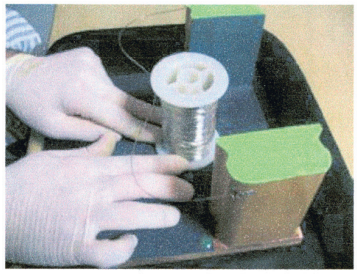

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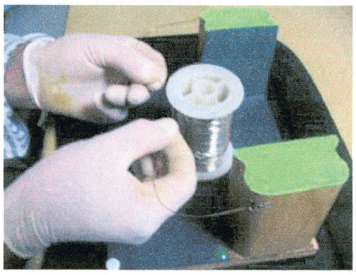

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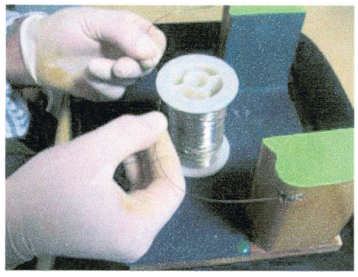

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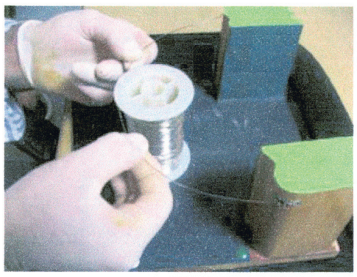

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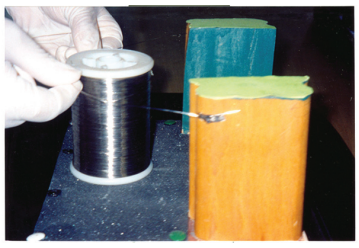

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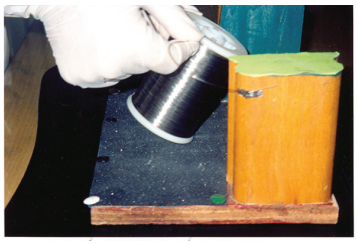

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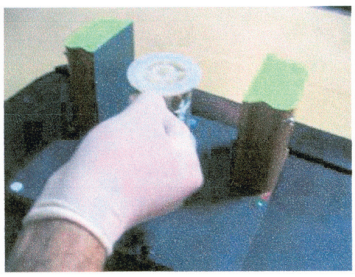
Sixth Experiment
Force: push & pull
Attachment: Semi Rigid

In this experiment wire ligature is wound round the physical object , then by tightening & fixing the end ligature we hold it so that the skin of the fingers touch outer part of the physical object.
Then the desired object is pulled forward . It is noticeable that the movable object is physically , bodily replaced.

In the next stage , instead of using fingers, we hold needle holder attached to physical object so that it is stuck to the outer surface of the physical object. In this stage, by pulling the physical object forward , it is bodily displaced. in another case the object is pushed backward by help of fingers and needle holder with the same particulars, but it is being tipped.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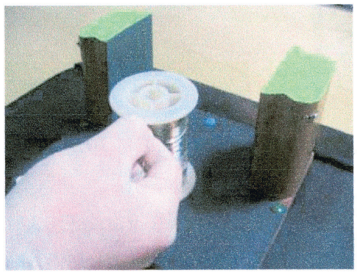
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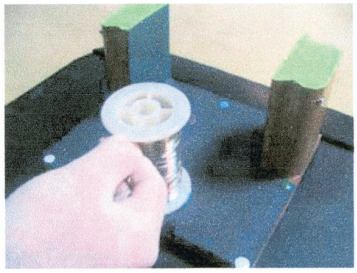
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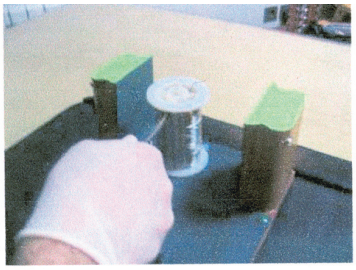
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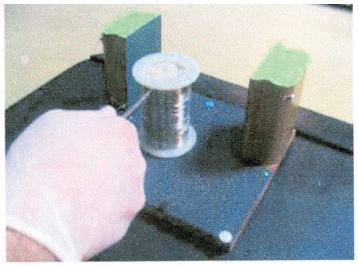
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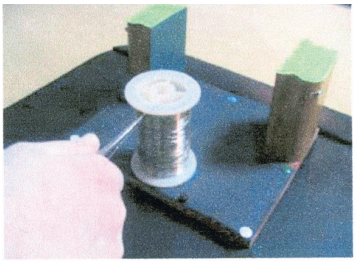
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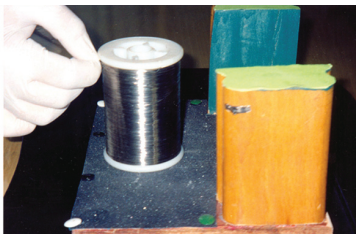
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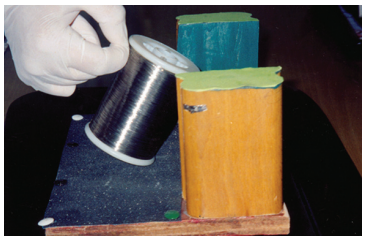
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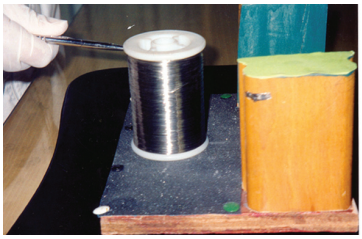
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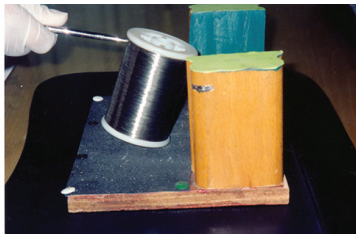
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Results:

-Of all experiments with „ Push ,, force , the physical object has been tipping . .

-Of all experiments with „ Pull,, force , with the exception of three cases , the physical object has been bodily displaced.

-The kind of attachment is highly effective on the quality of displacement.

-If the direction of pull-force effect is close to or coincided with the Centre-gravity of the physical object , it could cause bodily movement of the object , even if the kind of attachment is Non Rigid Attachment.

-The presence of Mesial Stop is highly effective on the augmentation of pull-force & the speed of bodily movement .

-for bodily movement of the object,the pull-force shoud be applied from out of arch wire and near to attachment point.

Conclusion:

By examining the results of experiments , it could be concluded that the pull-force is highly effective on the bodily replacement of physical object . It has also been proved that the kind of attachment plays a very important part in this replacement.

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Dentist & Orthodontist

Address:

29th Street,Seyyed Jamaleddin Acadabadi Street,Tehran,Iran.

H.Soltanpour

Postal Code:1433643937

Tel:0098-21-88701786

Fax:0098-21-88701796

Email:ortho_habib_soly@yahoo.com