Methods of learning to balance and ride a bicycle.
Different methods, their descriptions, advantages, disadvantages and effectiveness in maximising learner success rates.

Introduction

Maximising the number of individuals, particularly children, who successfully learn to balance and ride a bicycle is clearly very important for individuals, society and the cycling industry.

This can only be achieved by providing the equipment for and promoting the best and easiest learning method. Then more of the clumsier or disabled children will be able to learn and others can learn more quickly and easily, before some lose interest. If they learn, they will be able to take up cycling again at any time in their future lives. If not, they are unlikely to learn as adults and so are very unlikely to ever cycle. That will almost certainly reduce the amount of cycling in their future families too.

After learning to walk, run and possibly swim, cycling is surely the next most important physical skill to learn.
It is (a) an environmentally friendly way to travel for work, shopping or pleasure, potentially throughout, or at any time during, life. (b) excellent low-impact, anti-obesity, fitness exercise and (c) a huge and important boost for self-confidence, morale and "street cred" when a child learns to cycle unstabilised like and with brothers, sisters, friends and parents.

The methods, which I know of, and their advantages and disadvantages are described and ranked below in order of their effectiveness in enabling as large a percentage as possible of riders to learn to balance and ride a bicycle. The most helpful method (using Balance Training Stabilisers) is ranked and described first, followed by less and less effective methods. This article gives my own reasoned opinions and I would greatly welcome others` thoughts. As the overwhelming majority of learners will be children, this is assumed in this article, but clearly most of what is dealt with also applies to adult learners.

All my patents on Balance Training Stabilisers are now abandoned and I am ready to use my many years of experience of them to advise those who would like to manufacture and/or sell them. One form of these stabilisers won a U.K. Millennium Product Award and was featured in one of BBC T.V.`s prestigious "Tomorrow`s World" programmes.

For the above reasons, I believe that this article is of international interest and importance and I shall therefore seek and strongly welcome international publicity for it.

Problems in learning to balance (in order of importance).

(i) Pedalling causes the most complicated and worst imbalances because each push on a pedal is off centre in relation to the centre line of the bicycle. Such a push is complicated because it starts gently, builds up to a maximum force and then fades away again. It is then repeated on the other side of the bicycle. In confirmation, pedalling slowly uphill causes the most difficult imbalances. These are almost always corrected for by synchronising each pedal push imbalance with the balancing lean needed to correct for it. On the other hand balancing only to cope with the less important lateral instability, when moving at a similar speed without pedalling, is far easier and therefore usually requires only minor balance corrections.
(ii) Lateral instability is easier to learn to manage because of its fairly steady and unchanging nature as compared with the complicated and constantly changing forces due to pedalling. However it is the second most important balance problem needing to be learned to cope with by cyclists. This is because the bicycle tyre widths are narrow and therefore provide little lateral stability.
(iii) Centrifugal force occurs whenever the bicycle turns, i.e. ceases to go in a straight line. I believe that this is much less of a balance problem than (i) and (ii) because I have never heard of any learner having a problem with it even if they learned using stabilisers. Photos show that even my hemiplegic son with a poor sense of balance did it, unprompted, on the first day he cycled without stabilisers. This is probably because almost all learning cyclists will already have learned to lean to compensate for centrifugal force generated by turns in fast walking and running. Another factor which makes this force less important for learners is that they will nearly always be able to choose to turn only gently and gradually, so minimising the amount of centrifugal force generated. Once learners are able to successfully manage

pedalling, lateral instability and gentle turns unaided and simultaneously, it will normally be easy for them to practice and so manage sharper and sharper turns, by themselves.
(iv) Forwards/backwards stability is not a significant problem provided the front bicycle wheel is not a good deal more heavily braked than the rear wheel. This is because of the relatively great distance between the ground contact points of the front and back wheels.
(v) The most important of the above balance problems are therefore due to pedalling and lateral instability. It is therefore learning to simultaneously manage them and so keep the bicycle within the necessary close to upright angular range that needs to be concentrated on.

Method of balancing:- cycling in a straight line necessitates keeping the rider and bicycle`s combined centre of gravity close to vertically above the line joining the ground contact areas of the front and back wheels. When turning, that combined centre of gravity needs to be moved laterally far enough to compensate for the centrifugal force which turns generate.

In practice, balancing a bicycle by moving this combined centre of gravity is overwhelmingly accomplished by a continuous series of balance correcting leans. These balancing leans can only be very secondarily assisted (fine-tuned) by handle bar steers. This is because all such steers can do is to move the combined centre of gravity a little laterally in the direction being steered towards. Importantly please note that this does not in any way remove the necessity of the cyclist, moving in a straight line, still having to keep the combined centre of gravity close to vertically above the line joining the ground contact points of the two wheels.

In other words balance correcting leans can be a complete solution for both small and larger bicycle tilts away from vertical, but handle bar steers into a tilt can only be a complete solution for smaller such tilts.

Also, in general, as the cyclist`s speed increases, balancing becomes easier and easier, the importance of handle bar steers for balance decreases even more and there will be fewer such steers. Therefore, if a learner has previously learned how to pedal reasonably fast, learning to balance will be easier.

In unstabilised bicycle riding, balance-correcting leans and, for smaller balance corrections, handlebar steers are therefore used to **simultaneously** manage all of the above mentioned significant balance problems **and steer**. Trying to explain the complications of all this to most (particularly young) learning cyclists is probably not worthwhile, even if they understood! General advice to concentrate on their balance and keep themselves and their bicycles as upright as possible may however be helpful.

The ideal method of learning to balance and ride a bicycle would therefore (a) be proven to help as high a percentage of learners as possible to achieve success, even if they have a poor sense of balance and (b) introduce learners to the more important such balance problems (those due to pedalling and lateral instability) **simultaneously** and in easy, logical and gradual, confidence-boosting stages.

1. Balance Training Stabilisers
1.1 Method This is shown in the Diagram. The easier cycling skills of steering, braking and pedalling can be learned with the stabiliser wheels in the outer positions. Balancing can then be learned by adjusting the stabiliser wheels inwards, closer and closer to the bicycle`s rear wheel. Practice sessions in each such wheel position are a much easier way to gradually improve balance. After practice sessions with the stabiliser wheels in their innermost positions and advice on starting and stopping, the child will normally be able to ride an unstabilised bicycle. This should be tried cautiously with the teacher holding the back of the saddle for a few strides, but ready to let go quickly if they can feel that the child`s balance is by then good enough. It was even in the case of my son, whose balance is badly affected by hemiplegia.

1.2 Advantages The very strong supporting logic is that (a) the above stabiliser wheel positions are, stability-wise, like reducing a very wide rear tyre, in easy stages, to a less stable and less wide one. It is that gradual progression which is so important in gaining and developing the balancing ability and confidence so vital to learning cyclists (b) because of the important and complex imbalances caused by pedalling, learners ideally need to learn to balance while pedalling, as they do with Balance Training Stabilisers. (c) their mainly inward but also slightly downward stabiliser wheel adjustments maintain, between their stabiliser wheel ground contacts, a constant, close to vertical, angular range for the bike. As with these stabilisers, learners ideally need to become habituated to and learn how to maintain just such a close to vertical angular range for eventual unstabilised cycling. The angular range set is basically the same as that set by the only lateral stabiliser wheel position and the usually recommended gap under it for most conventional stabilisers. That angular range has proved sensible and successful for millions of those who used such stabilisers. See Diagram.
(d) feeling such stabiliser wheel ground contacts assists learners balance. It also simultaneously reminds them that the angular range limit has been reached and, as the wheels are moved inwards, balance corrections by a lean or a handlebar steer are more and more likely to be needed. Those are precisely the balance correction skills which the learner needs to practice and acquire for eventual unstabilised cycling. (e) if mass produced for small children, these stabilisers would cost little more than conventional stabilisers. (f) the very convincing practical proof, that balance training stabilisers work so well, is that the first three children who tried to learn by using them all had poorer balance due to disabilities and yet all succeeded despite that. What could be more convincing evidence that this is the easiest way to learn, not only for the disabled but, for others as well? (g) this method worked for my own hemiplegic son, despite his failure to learn by the prolonged and determined use of the "parental balance assistance" method. That is the second best method and is therefore described next. (h) this "balance training" method does not require the parent to be fit enough and willing and able to give the amount of time needed for the "parental balance assistance" method. (i) learners can become familiar with and confident on the bicycle (including learning to steer, brake and pedal) with the stabiliser wheels in their outer positions. The learner will almost certainly therefore have learned to pedal faster and with less concentration on it.
(j) the factors in (i) will make balancing and it`s learning much easier. (k) the frequency, number and in some types, distances of the stabiliser wheel lateral adjustments can be individually tailored to suit the balance ability and confidence of each learner.
In view of all the above it is very hard to see how a bicycle riding and balance learning system could be devised that would be easier, more effective in practice for the maximum percentage of learners, more logical and therefore more worthy of strong long-term backing by the cycle industry, parents and (for those with poorer balance due to disabilities) appropriate charities and therapists.
1.3 Disadvantages (a) Balance Training Stabilisers are U.K. made and not mass-produced. They are therefore relatively expensive at present, but that could be readily remedied and would be very worthwhile, particularly as I am no longer defending any patent. (b) Balance Training Stabiliser`s wheels have to be adjusted laterally. That is easy but still has to be done.

2. Parental balance assistance (usually after using conventional stabilisers)
2.1 Method Usually the child will have learned the easier cycling skills of steering, braking and pedalling on a bicycle helpfully fitted with conventional stabilisers. Those are then removed and the parent runs along holding the back of the, now unstabilised, bicycle`s saddle, in order to assist with bicycle balance and confidence. Hopefully, over several practice sessions, as the child`s bicycle balancing improves, the parent can gradually reduce the amount of balance assistance provided until the child is balancing by him or herself.
2.2 Advantages (a) the easier cycling skills of steering, braking and pedalling can be learned first, whilst the bicycle is stabilised. (b) the learner will almost certainly therefore have learned to pedal faster and with less concentration on it. Those factors will make balancing and its learning easier. (c) the parent can provide encouragement and assist with confidence development as well as being able to gradually reduce the amount of balance assistance provided. (d) this is an inexpensive method as conventional stabilisers are mass produced cheaply.

2.3 Disadvantages (a) the sudden total removal of the conventional stabilisers and their full balance support is still a very large step. Large numbers of children, particularly those handicapped by clumsiness, nervousness, shortage of determination or time or poorer balance due to disabilities may therefore never learn to balance a bicycle because of it. It certainly failed with my hemiplegic son, despite being tried with great determination. (b) the parents may not be fit enough or alternatively have sufficient time for the sessions of running along holding the back of the saddle. (c) can be unsuitable for heavier learner riders as the teacher, running along holding the back of the saddle, may well be unable to provide sufficient balance assistance.

3. <u>Tilt and steer</u>
3.1 Method This starts without stabilisers. First the rider straddles the bicycle with feet on the ground. The rider then practices tilting the bicycle with a slight lean and correcting that tilt with a steer of the handlebars in the direction of the tilt. In the second stage the teacher holds the rear frame of the bicycle, to provide the balance support necessary to allow the rider to put both feet on the pedals. Then the teacher tilts the stationary bicycle randomly in either direction so that the rider can practice steering the handlebars in the direction of the tilt and if necessary (for greater tilts) leaning in the opposite direction to the tilt as well. The third and final stage is identical to the final stage of the **Parental balance assistance** method with the teacher running along holding the back of the bicycle to assist balance while the rider pedals. Hopefully, by using his or her new balancing skills, the practising rider will need less and less balance assistance and finally be able to cycle unstabilised on his or her own.
3.2 Advantages (a) stabilisers are not needed (b) this method is claimed to be a fast way to learn. It certainly helps with some aspects of balance learning.

3.3 Disadvantages (a) the learner rider has not had the great advantage of stabilisers which allow the rider to get used to his or her bicycle and practice the easier cycling skills of pedalling, steering and braking without worrying about balance. (b) the rider therefore has to learn to pedal at the same time as trying to cope with the new, and most serious of all, imbalances which pedalling causes and the other imbalances. That is difficult, particularly as it is likely to mean that the rider will not be able to pedal as fast which will make learning to balance harder in general. (c) quite a lot of help and, particularly for heavier riders, strength and fitness is required from the teacher. (d) in view of (a) and (b) above this is almost certainly a fast way only for those who are more physically adept and confident. (e) as explained under "Method of balancing", balance correcting leans are considerably more important, in bicycle balancing, than steering into the tilt with the handle bars. I think this should be emphasised.

4. <u>Scooting (hobby horse)</u>
4.1 Method There are two variations of this (a) the child can be started on a special pedal-less "hobby horse", with the child`s feet touching the ground on both sides so that he or she can push the hobby horse along with his or her feet and so gradually get used to balancing for longer and longer on two wheels. Before progressing the child needs to have learned to be able to ride down gentle inclines for considerable distances, without putting a foot down.
(b)however why go to the very considerable expense of buying such a hobby horse when all that needs to be done to arrive at the same effect is to remove the pedals and lower the saddle of a bicycle sized so that the child can later, hopefully, learn to ride it unstabilised? The learning process is then as described under (a), until the child`s balance has improved enough for the saddle to be raised to the proper height for riding by pedalling and the pedals have been replaced.

After (a) or (b) the learner graduates, as the final stage, to an unstabilised bicycle with pedals which at least some children, trained by this method, are then able to ride.
4.2 Advantages are the same as those listed under **3.2**.

4.3 Disadvantages are the same as those listed under **3.3**, points (a) and (b) with the following additions; (c) the very considerable extra expense of the hobby horse (if used) or (d) the removal and later replacement of the bicycle`s pedals and the lowering and later raising of it`s saddle. (e) this method no doubt works for some physically well co-ordinated children but seems highly unlikely to be successful for those with nervousness or a poorer sense of balance, particularly because the final stage represents such a huge leap.

5. Raising conventional stabiliser`s wheels

5.1 Method In this the child first learns to pedal, brake and steer whilst using conventional stabilisers in the usual way. The stabiliser wheels are then raised in stages with practice sessions at each stage, in order to hopefully steadily improve balance.

5.2 Advantages (a) the child will have learned to pedal, brake and steer and become familiar with the bicycle. (b) because of (a) the child will also be able to pedal faster and with less concentration on it, which will make learning to balance easier. (c) ordinary stabilisers can be used and these are cheap for smaller children.

5.3 Disadvantages (a) the tilt angle, when the stabiliser wheels touch the ground, will increase with every upward adjustment of them. During this process the child therefore has no chance to become habituated to the kind of constant, close to vertical angular range that he or she will need to maintain for successful unstabilised bicycle riding. (b) with each upward stabiliser wheel adjustment, the balance assistance and the warning feeling and sound, due to the stabiliser wheels touching the ground, will unfortunately come later and later. Therefore the gravity accelerated and diagonally downward velocity due to an uncorrected lean will become greater and greater. That increasing velocity will therefore become harder and harder and perhaps ultimately impossible, for balance correcting leans to counteract. (c) gaps between the stabiliser`s holes and slots for fixing and adjustment may make it impossible to set some of the gaps under the stabiliser wheels which would be desirable. (d) perhaps for some or all of the above reasons no instructions of any conventional stabilisers that I have knowledge of suggests this method for learning to balance a bicycle.

6. Sprung stabilisers

6.1 Method the only sort which I have seen has two modes according to its distributor. In the first or "fixed" mode they can be used like conventional stabilisers i.e. to learn to steer, pedal and brake and generally become familiar with the bicycle. In the second or "confidence" mode, the child is said to be worried because he or she can now lean. The distributor`s spokesman said that the child will naturally want to ride in a fairly vertical position. (This is true for any method of learning to balance.) The spokesman said that when the parent noticed sufficient improvement in maintaining that position, the stabilisers should be removed and the child should be able to ride unstabilised.

6.2 Advantages (a) if it worked for a high percentage of learners this would be a good method, however its major disadvantage (see below) appears to me to be, logically, so serious as to make this seem highly unlikely. It may work for some of the physically adept children, but then any method is likely to work for some of them. Some achieve success without any assistance at all, just repeatedly getting on the bicycle and trying until they succeed.

6.3 Disadvantages (a) the spokesman said that the further from vertical the child leaned the stronger these stabilisers resistance to tilting became. These stabilisers are therefore helping the rider to keep upright pretty effortlessly and so with little or no improvement to his or her own bicycle balancing skill. Surely that is totally opposite to the situation with an unstabilised bicycle, since then the further the child leans away from vertical the faster his or her "non-spring-resisted" diagonally downward acceleration under gravity becomes. Surely these stabilisers therefore train their users to subconsciously expect strengthening resistance as they lean further away from vertical on their first unstabilised bicycle ride. Instead there will suddenly be no resistance at all and they are highly likely to feel very alarmed, lose confidence and/or possibly fall. Unless I am missing a vital point it seems to me that this is a rather unsafe method, offering anything but the "fast progression to unaided cycling" promised. (b) in view of the above these sprung stabilisers are, in my opinion, worse than ordinary conventional stabilisers. (c) sprung stabilisers are also more expensive than conventional stabilisers.

7. Conclusion

In view of all the above and, in regard to Balance Training Stabilisers, it is very hard to see how a bike riding and balance learning method could be devised that would be easier, more effective in practice, more logical and therefore more worthy of immediate strong long-term backing by the cycle industry, parents and also for the disabled, appropriate charities and therapists.

The gradual progression by small steps is the main reason which makes the Balance Training Stabilisers so much easier and better than the other methods described in the article. All of them, in contrast, include a big step which will prove impossible for some children who could have learned using the much more gradual Balance Training Stabilisers method.

Therefore I hope that the cycle industry will now take steps to ensure that these very important stabilisers will be far more widely made, promoted and sold soon, so as to maximise the number of individuals who successfully learn to balance and ride a bicycle.

In order to facilitate this I shall seek and welcome worldwide publicity amongst all of the above groups.

To make commercialisation easier, I have now abandoned all my patents and am ready to use my many years of experience with these special stabilisers to advise and help those who would like to manufacture, sell, recommend, write about and use Balance Training Stabilisers.

David Good October 2007.

Good Designs, 60 Gwel Eryri, Llandegfan, Menai Bridge, Anglesey, LL59 5RD, U.K.
Tel/Fax: +44 (0) 1248 713624 www.disabledcycling.f2s.com